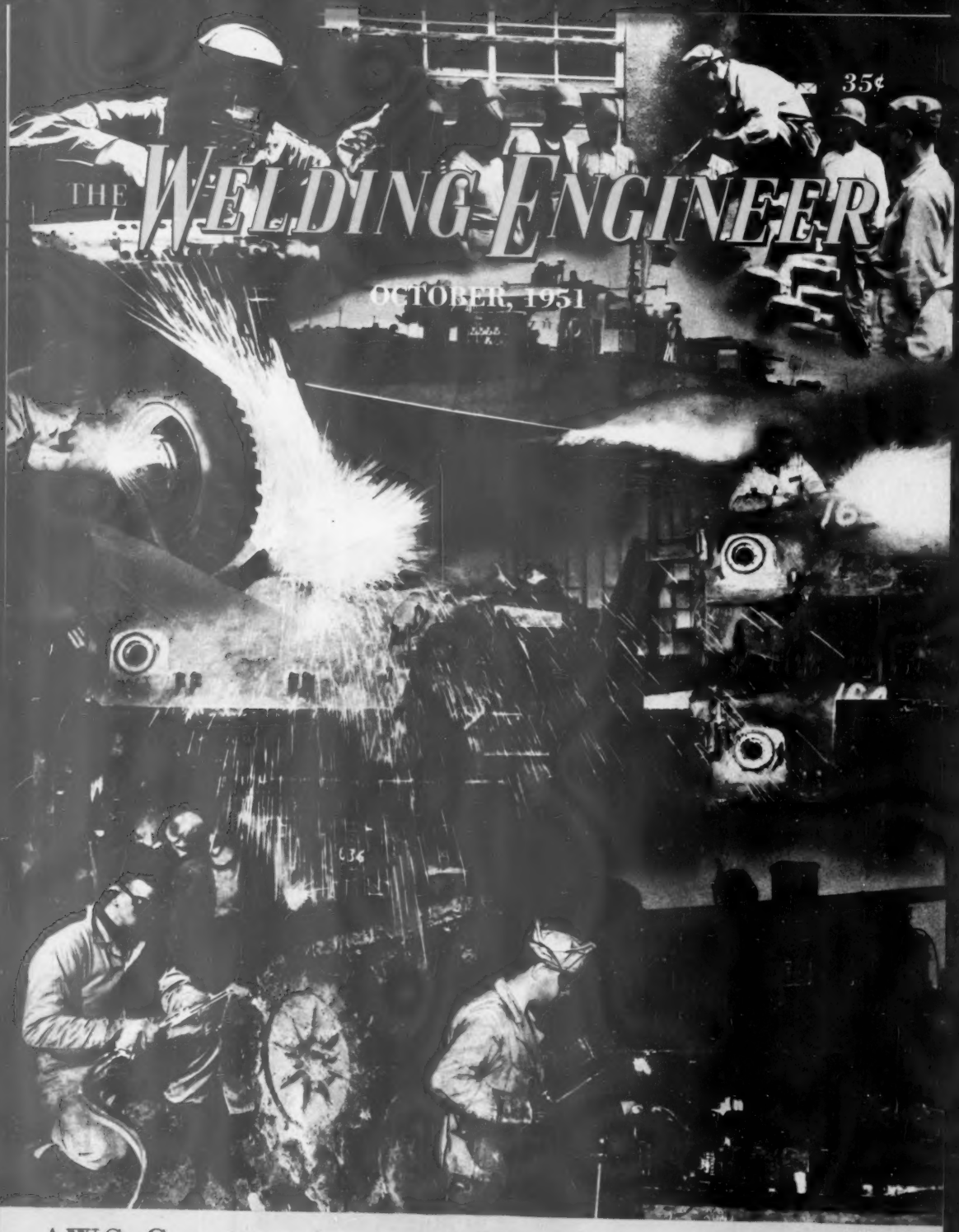


THE WELDING ENGINEER

35¢

OCTOBER, 1951

AWS Convention and Metal Show Number

Welding Equipment Maintenance . . . 33

Welding at War . . . 51

A McGRAW-HILL PUBLICATION

new Unigoggle

Another JACKSON First!

A One-Cup Headrest Goggle
made expressly for Gas Welding, Flame Cutting and Brazing

- **GOGGLE,** with its large ventilated inside area, is lighter, cooler, easier to wear. Its one-piece molded plastic is strong, flame resistant, non irritating to the skin. It bears lightly, yet firmly, against cheeks and forehead, where its good fit excludes light and heat rays. It may be worn over regular prescription glasses or safety spectacles.
- **LENS,** available in Federal Specification shades 3 through 6, is of standard 2 by 4¼" size, protected by a cover glass. New spring clip fastening makes the lens easy to replace; no tools are needed.
- **HEADREST,** with cork sweatband for comfort, is of light, easy to clean plastic, and is readily adjusted to any head size. Spring, concealed within telescopic arms, holds goggle snugly against the face. Hinged from opposite sides, weight is evenly distributed.

JACKSON UNIGOGGLE type W-60, shown above, has plastic headrest, telescopic arms.

JACKSON UNIGOGGLE type WR-60, shown at left, has same eyecup and choice of lens shades, but is held against the face by an adjustable, elastic headband.

Goggle fits cheeks and forehead snugly, gently, with wide rim for comfort

To raise, pull up and forward in one quick movement . . . takes one second

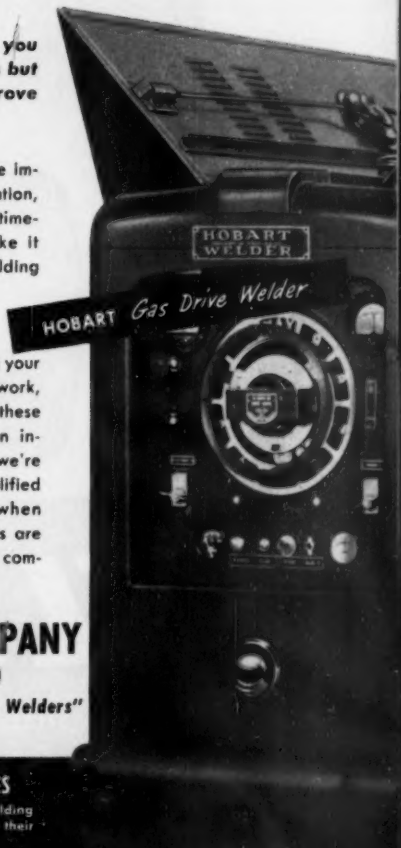
Put back on guard again, goggle protects this welder quickly, comfortably

JACKSON
PRODUCTS
WARREN · MICHIGAN

sold World-Wide . . . through Distributors and Dealers

Whether inside or outside, there's EXTRA PROFIT for you with

HOBART simplified ARC WELDERS



With Hobart Simplified Arc Welders you get profits that are not mere claims but actual facts—facts that you can prove to yourself by actual test.

An actual test will bring out facts that are immediately apparent, such as cooler operation, extra capacity, easier arc control, and time-saving exclusive features—which make it easier for your operator to do more welding per day with better penetration, with fewer rejects, and with less effort to them.

If you are not using Hobart Welders on your production, construction or maintenance work, it's time you made an investigation of these money-saving, profit-making welders. An investigation costs you nothing—in fact, we're anxious to show you how Hobart Simplified Welders can help you in these days when higher production costs and lower profits are a real problem. Just mail the coupon for complete details—no obligation.

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STAINLESS STEEL, MONEL, NICKEL and INCONEL WELDING FITTINGS

Preferred for Dependable Corrosion Service

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NEW CASTLE, PENNSYLVANIA

World's Largest Manufacturer of Stainless Welding Fittings

THE WELDING ENGINEER

A McGRAW-HILL PUBLICATION

VOLUME 36 NUMBER 10

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THE WELDING ENGINEER • OCTOBER • Vol. 36—No. 10

(with which is combined The Acetylene Journal)
Member ABC and ABP

Published monthly, with an additional directory number in June, by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Publication Office: 671 North Franklin St., Chicago 10.

Executive and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.
Editorial Offices: 520 No. Michigan Ave., Chicago 11, Ill.

Subscriptions: Address correspondence to The Welding Engineer—Subscription Service, 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address. Please indicate position and company connection on all subscription orders.
Single copies 35c. Subscription rates—United States and possessions $3 a year; $4 for two years; $5 for three years. Canada $5 a year; $8 for two years; $10 for three years. Pan-American countries $15 a year; $25 for two years; $30 for three years. All other countries $15 a year; $25 for two years; $30 for three years. Entered as second class matter Aug. 23 1948, at the Post Office at Chicago, Ill., under Act of Mar. 3, 1879. Printed in U. S. A.

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THE WELDING ENGINEER is indexed regularly by Engineering Index, Inc.

OCTOBER, 1951

COVER: *Photos showing different aspects of "Welding at War" are reproduced through courtesy of the U. S. Army, U. S. Air Force and U. S. Navy. More details on page 90.*

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See INVINCIBLE
Flux Recovery Units
at the
METAL SHOW
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Invincible Flux Recovery Unit installed directly above welding machine. Salvaged flux is automatically fed back into hopper of welding head.

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On thousands of submerged arc welding jobs, Invincible units have quickly repaid their costs by:—

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NEWS FROM WASHINGTON

NPA May Scrap Its Single-Band Priority

A PROPOSED new "superrating" that will take preference over all other ratings is said to be ready for introduction. The new "DX" priority rating is being set up to give the military establishment first call on end-products normally considered as civilian goods. These are products that are not classified as controlled materials but which are becoming more necessary to the mobilization program.

Here's where manufacturers may have to watch out:

Apparently, the DX rating may be extended by the producer for those end items needed by the military so far as non-controlled materials are concerned, but the producer may find himself unable to extend this rating to replace the controlled materials used in the manufacture of these end items. Hence individual adjustments may be necessary.

If the superpriority system is adopted, it may be an indication that the controls set-up is moving away from a Controlled Materials Plan to a preference rating system.

Mine Machinery Order May Be Issued Soon

UNLESS they can get more materials, mining machinery manufacturers told NPA, they may be forced to convert to production of machine tool components or direct military goods. To answer this complaint, NPA indicated it might issue an order authorizing mining machinery manufacturers to use a defense rating to get components for new equipment as well as to schedule deliveries of mining machinery to mine operators.

First Quarter 1952 Construction Allotments

BECAUSE of the critical shortages of the controlled materials and particularly of structural steel, requests to NPA for allotments and permission to build are required for projects that will take more than certain specified amounts of these materials. Fourth quarter 1951 allotments were drastically cut because of the acute shortage of structural steel and many applicants were not given allotments.

NPA Administrator Manly Fleishman emphasized that the projects not approved are not permanently denied but have had to be deferred until some later date. In the meantime, NPA notified all applicants for advance allotments of controlled materials for construction scheduled for the first quarter 1952 and succeeding quarters to file their CMP-4C applications by September 20.

Copper Welding Rod Resellers Use CPR 67

RESELLERS of brass mill products, including copper or copper-alloy welding rod and welding wire, were transferred from under GCPR (General Ceiling Price Regulation) to coverage under the resellers' ceiling price regulation (CPR 67), effective September 10, 1951. The pricing policies of CPR 67 are covered in detail this month in the item headed "Traditional Mark-up for Machine Resellers."

On August 23, CPR 68 was issued by OPS covering producers of brass mill products. Simultaneously, on the same date, copper and copper alloy welding rod and welding wire were taken out from under CPR 30, the machinery manufacturers' regulation and transferred under CPR 68.

Welded Wire Fabric for Control January 1

NPA HAS DECIDED to include welded wire fabric in its list of controlled materials as of January 1, 1952.

After the first of the year, manufacturers of welded wire mesh will be permitted to accept only ACM (Authorized Controlled Materials) orders for their products, and existing DO orders must be converted to ACM orders before then. Failure to do so would mean losing one's place on manufacturers' production schedules.

The previous failure to include welded wire mesh among the controlled materials has resulted in an additional drain on manufacturers of this material. Traditional customer-supplier relationships have been upset in this field as small consumers of controlled materials certified themselves for abnormally large amounts.

Under the new plan, wire mesh manufacturers would be classed as "further converters," under Section 8 of NPA's basic steel order. Information on their production patterns for the first quarter of 1950 is now being gathered, and will be used as a guide for determining future welded steel mesh requirements.

Further standardization of mesh sizes in material to be used in concrete products would result in increasing the output of wire mesh, it has been pointed out, and buyers are advised to specify the standard sizes listed in the Simplified Practice Recommendation of the Commerce Department wherever possible.

Brazing Techniques Pamphlet Available

ANOTHER in the series of pamphlets intended to help the small manufacturer during the national emergency has been issued by the Office of Small Business of the Department of Commerce. This one is entitled "Increased Production through Improved Brazing Techniques," deals with the advantages of joined components over one-piece machining and discusses improved brazing methods and the selection of proper brazing materials.

Not only can the adoption of brazing techniques result in marked savings, the pamphlet points out, but the final units last longer, weigh less, and look better.

Copies of this four-page pamphlet are available without cost from Department of Commerce

NEWS FROM WASHINGTON (Continued from page 5)

field offices, or from NPA, Printing & Distribution Division, New GAO Building, Washington 25, D. C.

DPA Says Welding Saves on Structurals

TO HELP conserve the extremely-short supply of structural and reinforcing steel in building construction, DPA has adopted a set of standard design practices for use in the construction industry (DPA Release 121).

While DPA is not prohibiting the use of steel in any kind of construction, it recommends that builders would do well to make use of the recommended construction conservation practices to get controlled materials without delay.

Among the recommendations made, it is stated "that in structural steel design appreciable tonnage savings are often possible through welding, etc.—" and also that "up to 25% in reinforcing steel weight may be saved by welding heavy column rods in lieu of splices dependent on bond value."

NPA finds little adoption of these basic conservation methods in the many requests for materials allocation and permission to commence construction. NPA officials say that because of this situation many necessary projects will have to be deferred owing to an insufficient supply of certain critical materials.

Traditional Mark-ups for Machine Resellers

THOSE WHO are engaged in the reselling of machinery and related manufactured goods are to be permitted their pre-Korean percentage mark-ups under the new OPS Ceiling Price Regulation 67. It is the aim of the regulation to restore normal price relationships between resellers and manufacturers, between the resellers themselves and between the various commodities sold by any one reseller.

The new ceiling price is to be determined in one of four ways:

(1) For a commodity with a manufacturer's published list price, the reseller simply deducts the discount, if any; or

(2) He adds the same percentage mark-up that he applied during the last preKorean calendar quarter (April 1 to June 24); or

(3) If he did not use a list price, he adds the percentage mark-up he used during the same calendar quarter to his present legal cost; or

(4) If these methods do not work, he applies to OPS for a ceiling price.

By this method, OPS says, it will be possible to verify ceilings easily and precisely so that effective enforcement can be accomplished.

Resellers are defined, under the order, as those who sell but do not manufacture products. Many of those covered deal in a vast number of parts and accessories—as many as 300,000 in some cases.

New Basic Materials and Alternates List

RAPID changes in the availability of many materials have necessitated a new issue of "List of Basic Materials and Alternates." In the list, which is now being distributed by district and regional offices of the Department of Commerce, over 400 materials are classified according to their present availability. The list has been set up as a guide to industry, government agencies and the Armed Services in their purchase of materials. Emphasis is placed on the use of alternates to substitute for critical materials. Further revisions of the list will be made as needed in order to keep abreast of changes in supplies.

The 400 materials are classified in the list in three groups:

Group I, "in very short supply";

Group II, "in approximate balance with essential demand";

Group III, "in fair-to-good supply."

"Manufacturer" Means One Who Makes Goods

A LARGE number of sellers have been excluded from coverage under CPR 30 by a new OPS definition of the term "Manufacturer." Whereas previously any person who sold a commodity under his own brand or trade name was classed as a manufacturer, the designation has now been limited to include only those who actually produce the same or a similar commodity which they sell under the brand or trade name. The designation is also used where the commodity which the manufacturer sells under his own brand or trade name is a replacement for a commodity which he produces in his own plant.

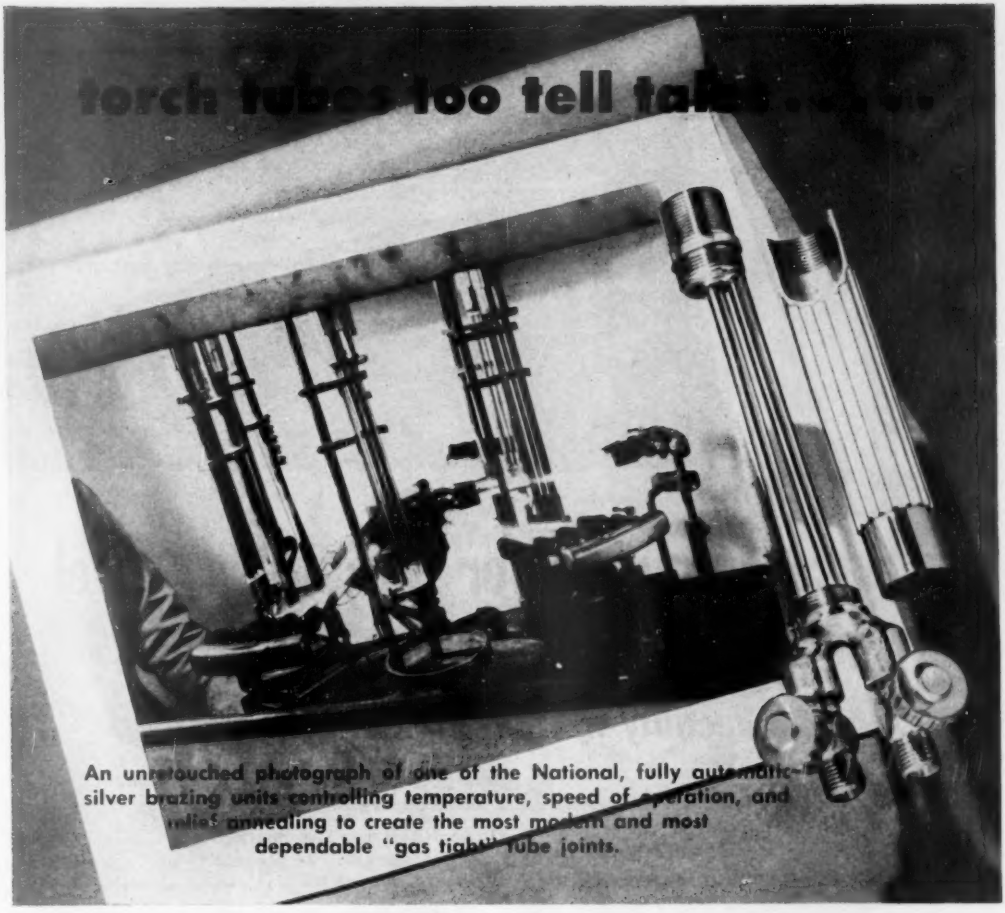
Sellers who have been removed from CPR 30 coverage under the new definition will henceforth determine their ceiling prices under the General Ceiling Price Regulation.

Information for Defense Industries

NEWS of what is happening in the mobilization build-up is being made available to both management and labor through a little known but highly efficient agency of the Department of Defense; namely, the Industrial Services Branch of the Office of Public Information. This recently established branch combines the functions of the Industrial Services Division of the War Department and the Industral Incentive Division of the Navy, which were the information sources in World War II.

Among its other activities, the Industrial Services Branch produces, on request, information or photographs of activities within the Defense Department of interest to the industrial press; it distributes posters, motion pictures, exhibits and other materials designed to stimulate defense production; and it publishes a biweekly "Military Production News," as a round-up of the current requirements and policies of agencies in the Department of Defense.

For more detailed information, address your request to: Chief of the Industrial Services Branch, Office of Public Information, Office of the Secretary of Defense, Washington 25, D.C.



An unretouched photograph of one of the National, fully automatic silver brazing units controlling temperature, speed of operation, and relief annealing to create the most modern and most dependable "gas tight" tube joints.

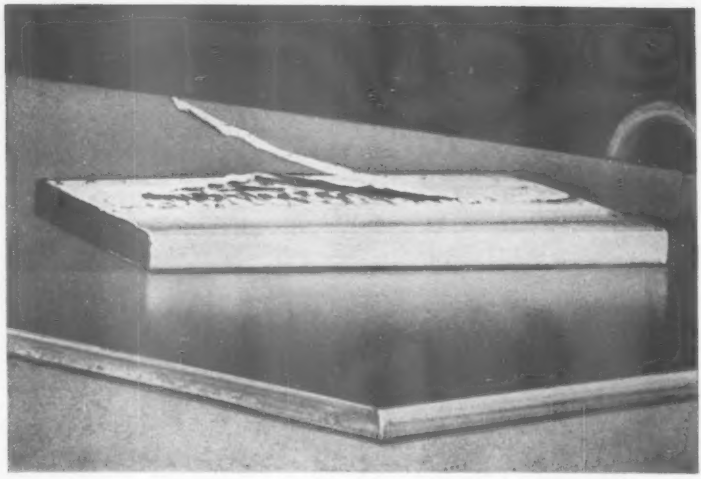
Silver brazing, with relief annealing, assures gas tight and wholly dependable joints and — since both fuel gas and oxygen are separately conveyed — in independent tubings — no gas flows within the torch handle — this for your safety.

No gas flows in the torch handle — it's safe.

For safety sake each gas, the oxygen and the fuel gas, is separately conveyed from the torch needle valve body to the torch head — no gas flows in the torch handle.

For safety sake both the oxygen and the fuel gas tube is securely and permanently fastened by the most modern, fully automatic, silver brazing process which controls both temperature and timing.

Made by National SINCE 1910 WELDING EQUIPMENT CO., San Francisco 5, California



This weld in Nickel-Clad Steel shows the self-lifting slag which the "141" nickel electrode gives when there is a proper balance in the welding conditions.

New Inco Electrode for Nickel-Clad Steel

"141" Nickel Electrode makes possible high ductility in iron-diluted nickel welds

The new Inco "141" nickel electrode for Nickel-Clad Steel is a companion to the Inco "131" nickel electrode for solid Nickel. Its new core wire and new flux make it possible to obtain high ductility when welding the clad side of Nickel-Clad Steel... overlaying nickel on steel ... welding nickel to steel.

"141" is corrosion-resisting. Welds made with the "141" electrode on Nickel-Clad Steel or overlays on steel will have corrosion resistance comparable to that of solid nickel, providing adequate control is exercised over the iron dilution of the welds.

"141" meets Code requirements. Welds made with the "141" nickel electrode meet the requirements of the A.S.M.E. Unfired Pressure Vessel Code for construction of units covered by Case 896 (Clad Steels) and Case 1078 (applied linings).

Slag removal is easy, too. When the balance between heat input, speed of welding and iron dilution is right, the slag will lift from the weld about 3 inches behind the arc.

Mechanical Properties

(a) Nickel overlays on steel will have a minimum elongation of 30 per cent.

(b) Welds in the clad side of Nickel-Clad Steel will have a minimum elongation of 30 per cent.

(c) Welds in solid nickel will have a minimum elongation of 20 per cent.

(d) All weld metal tensile specimens (iron free) have the following properties:

Minimum yield strength (.2% offset) .....30,000 psi.
Minimum tensile strength .....65,000 psi.
(Hardness) Rockwell B 70-80

Like other Inco products, much of the "141" electrode production is being diverted to defense at present. However, Inco's Technical Service Section is always ready to help you with ideas and suggestions for your present production and future planning.

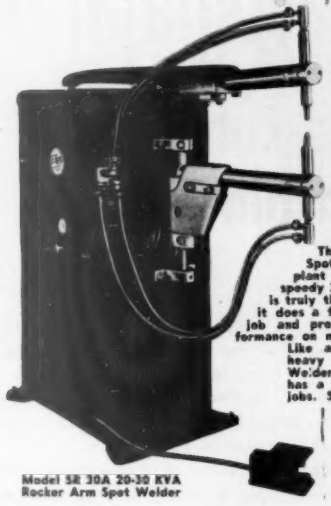
Write today, outlining your problems. Also, ask for your free copy of revised Inco Bulletin T-2, "Fusion Welding of Nickel and the High-Nickel Alloys."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

DESIGNED
For Speedy, Steady Production . . .

Banner

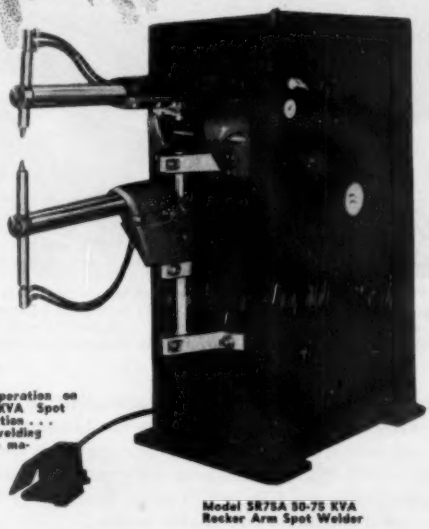
ROCKER ARM SPOT WELDERS



Model SR 30A 20-30 KVA
Rocker Arm Spot Welder

These two Banner Rocker Arm Spot Welders will help gear your plant for peak production! The speedy 20-30 KVA Rocker Arm Welder is truly the race horse of the team as it does a fast, accurate production line job and provides a wide range of performance on mild steels.

Like a work horse in its steady operation on heavy duty work, Banner's 50-75 KVA Spot Welder delivers continuous high production . . . has a capacity to do a variety of welding jobs. Special design features of both machines provide a 1 to 1 ratio on the 24" throat permit welding of certain applications usually done only on a Press Type Welder.



Model SR75A 50-75 KVA
Rocker Arm Spot Welder

Banner Welders Offer Outstanding Construction Features

FRAME: Sturdily constructed of heavy ⅜" boiler plate formed and securely welded. For easy servicing the 50-75 KVA machine has detachable side panels and the 20-30 KVA unit has a large rear door.

CONSTRUCTION: Heavy castings of special, hard, high strength, high conductivity copper alloy are employed throughout the 50-75 KVA model. Enclosed heavily ribbed rocker arm is of gray iron casting mounted in a pivot pin assembly with Oilite bushings.

50-75 KVA welder has a 28" dimension from the pivot point to the end of the push rod connection facilitating better than 1 to 1 pressure ratio on 24" throat. This unusual feature permits the welding of certain applications normally practical only on a Press Type Welder.

TRANSFORMERS: Both welders operate with 220 volt or 440 volt water-cooled transformers built in accordance with industry specifications and are equipped with 8 point Heat Selector switches, the larger units having the series/parallel type permitting heavier duty.

Carefully engineered construction of 50-75 KVA Banner Welder makes it the leader in the field. Advantages are: *fast action*—capable of 180 spots per minute—and *accurate performance* due to balanced moving parts and Oilite bushings throughout. Quality accessories include double-acting air cylinder, four-way solenoid valve, regulator, strainer and gauge.

BANNER is in a NEW Home!

To meet the growing demand for its welders, Banner announces the opening of larger and greatly expanded facilities for the manufacture of their resistance welding equipment.

Specific data sheets and catalog available. Write today!

BANNER MANUFACTURING CO.

6822 NORTH 43rd STREET MILWAUKEE 9, WIS.

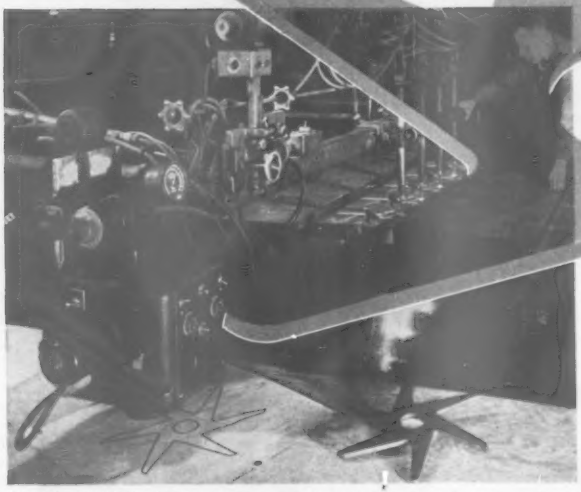
Banner manufactures a complete line of Gun, Seam, Rocker Arm and larger Press Welders and Specials to 200 KVA. Inquiries invited.

precision cutting... unlimited

with

Airco Oxygraph and Travograph

gas cutting machines



CUSTOM-TAILORED SHAPES . . . a large steel warehouse uses Airco *Travographs*, equipped with Electronic Tracing Devices to produce an almost endless variety of steel shapes . . . custom-cut singly or in quantities with full precision and accuracy—providing them a time-, trouble- and money-saving customer-service.

Fast, modern multiple-torch gas cutting with an Airco *Oxygraph* or *Travograph* machine has brought "precision" within the scope of all flame cutting operations. Plates, slabs, billets and forgings are accurately shaped; squared or beveled—in any quantity, faster . . . at less cost than with any other known method.

Accuracy in continued service has won both these rugged, gas cutting machines wide acceptance as production tools. From the basic design, maximum resistance to torsion and deflection are built into each machine—guaranteeing faithful reproduction.

The *Oxygraph* is a stationary machine, designed for operation with one or more torches for multiple cutting, "stack" cutting, or multiple-torch "stack" cutting. Machine cutting ranges are: largest square 43" side; largest circle 52" dia.; longest straight line 133"; rectangles 3" x 131" to 33" x 40".

The *Travograph* has the same basic design as the *Oxygraph*. However, it is a mobile unit—mounted on a carriage which travels on steel rails. Maximum cutting width is 12'. The cutting length is limited only by the length of the rails, installed in 16' sections.

To afford the greatest flexibility of operation, Airco offers three distinct types of tracing devices—manual, magnetic and electronic. With the electronic device, popularly known as the "Electronic Bloodhound," only an outline drawing or silhouette is needed as a guide. Countless designs . . . from simplest to most intricate—inside and outside *square* corners, obtuse and acute angles, narrow slots, and innumerable other shapes may be cut with extreme accuracy.

For complete data about these two outstanding Airco gas cutting machines, write your nearest Airco office for Booklet ADC 628C.

AIRCO

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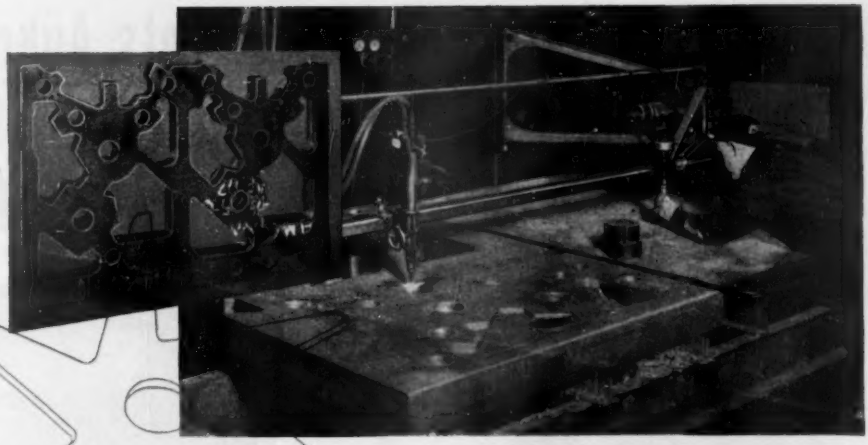
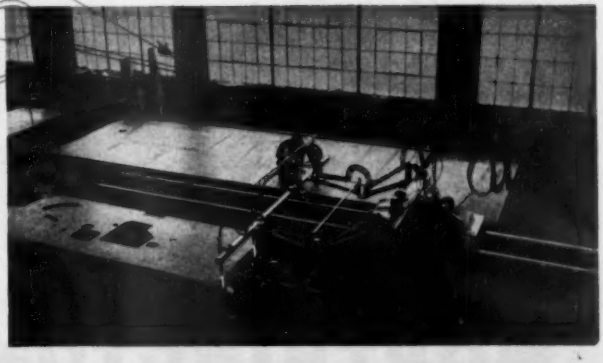
Offices in Principal Cities

AIR REDUCTION . . . PIONEER



MINIMIZES SCRAP LOSS . . . a nationally known steel fabricator uses an Airco *Oxygraph* for cutting printing press side frames where specified tolerances must be held to an unusually high degree. This permits the most economical utilization of steel with minimum scrap loss, and the machine's extreme accuracy effects considerable savings in machining time and cost; and often makes finish-machining unnecessary.

REDUCES PRODUCTION TIME . . . a huge steel mill speeds metal cutting with an Airco *Travograph*. Plates, slabs and billets are shaped—cut to dimensions, squared and beveled for subsequent fabrication—at an almost unbelievable reduction in production time. Heavy or light sections, regular shapes or intricate contours are all cut with equal facility.

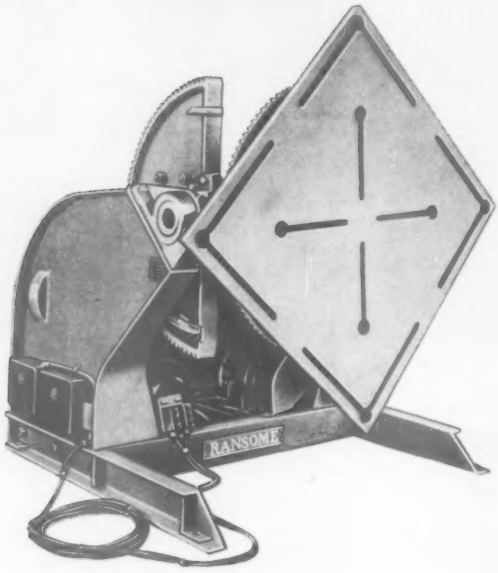


CUTS STEEL WASTE . . . another steel fabricator uses the *Travograph* to cut out sides for large bottle washing machines. They found this machine able to cut these wide sections without moving the work — and because of the accuracy of the cut, steel waste is reduced to a minimum.

DESIGNERS OF FLAME CUTTING MACHINES FOR EVERY PURPOSE

Lots of Different Pieces or Lots Alike...

THIS POSITIONER PAYS OFF



in more production . . . better welds . . . less rod waste

The universal table top makes the Worthington-Ransome Welding Positioner as profitable on *job* work as it is in mass production. Those "T" slots make the table adaptable to any shape of work piece and a wide range of sizes. No special jigs or fixtures needed.

Whether you produce "thousands alike" or "every one different", benefit from *increased arc-time* with Worthington-Ransome Welding Positioners. With just one set-up, the work is clamped to the table top. Then push-button controls or simple hand cranks do the work of tilting or rotating into any position convenient for economical downhand welding. Your welder can continuously weld without costly time and labor wasted in frequent rehandling of the work.

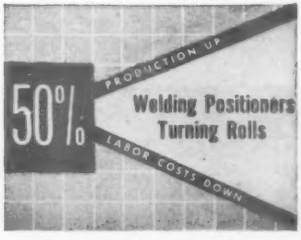
Result—up to 50% more footage, *better* welds (using higher current and heavier rods), less welding rod waste.

Welding positioner capacities from 100 lb to 30 tons. Also: turning rolls from 3 to 150 tons, stationary or self-propelled.

Write Worthington Pump and Machinery Corporation, Dunellen, New Jersey, for bulletins or additional information.

Y.1.2

WORTHINGTON



Simplified Precision Welder Control

for easier maintenance and increased dependability

Class 8993 NEMA Type S2H Synchronous-Precision Controller available with 600 or 1200 frame contactor. Can be arranged either for side of machine or wall mounting.

APPLICATION: *for welding stainless steel, nonferrous metals, and other critical spot welding jobs requiring electronic synchronous-precision control. (Available with current wave shape control auxiliaries for aluminum or alloy metals.)*

DESIGN LEADERSHIP features

Easier Maintenance . . . greatly simplified circuits require fewer tubes and only one operating relay (for the air valve).

Increased Dependability . . . all components designed specifically for industrial welder service. Tube circuits are fail-safe and initiating contacts are in isolated 24 volt circuit which supplies power to the valve relay.

Consistent Accuracy . . . regulated DC voltage on tube control grids compensates for supply fluctuation or tube variations . . . assures timing accuracy.

Greater Accessibility . . . timer, heat control and firing panels designed for easy inspection and maintenance, with quick fasteners and plug connectors.

Write **for BULLETIN 8993**
or consult your nearby Square D Field Engineer

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October 1st Marks 20 Years of Service

By Machinery and Welder Corporation to the Industrial Midwest

As Distributors of Leading Welding Products

Distributors for:

GENERAL ELECTRIC COMPANY
AC and DC Arc Welding Machines, Electrodes and Accessories

PRECISION WELDER AND MACHINE COMPANY
Resistance Welding Machines

P. R. MALLORY COMPANY
Resistance Welding Tips and Alloys

WORTHINGTON PUMP AND MACHINERY COMPANY
Welding Positioners and Turning Rolls

RUEMELIN MANUFACTURING COMPANY
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AMERICAN STEEL AND WIRE COMPANY
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Shape Cutting Machines

FROM SEVEN SALES OFFICES Machinery and Welder Corporation sales engineers serve their customers with the application assistance necessary to utilize better the products they sell. Machinery and Welder Corporation salesmen are qualified welding engineers, equipped to serve as well as sell. Their industry-wide experience enables them to give you information on how to get the most from your welding equipment. They are ready at all times to assist you in solving your welding problems.

FROM FOUR WAREHOUSES in Chicago, Moline, Milwaukee and St. Louis, and sales offices in Des Moines, Iowa, and Peoria and Rockford, Ill., Machinery and Welder Corporation is able to provide welding products when you need them. These strategically located and fully-stocked warehouses increase your assurance of a steady, reliable source of supply for all of your welding equipment and supply requirements.

MACHINERY AND WELDER SERVES THE INDUSTRIAL MIDWEST WITH DEPENDABLE LEADING PRODUCTS

As General Electric Distributor for AC and DC ARC WELDING MACHINES, MILD STEEL ELECTRODES, STAINLESS STEEL ELECTRODES and ACCESSORIES, the Machinery and Welder Corporation is proud to be able to recommend this proven line to welding users in its industrial territory. General Electric traditionally fine equipment lasts longer, requires less service and "stays sold." As a G-E Distributor, Machinery and Welder Corporation can provide you with the best in welding equipment to produce better welded products.

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MACHINERY AND WELDER CORPORATION

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TO

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FOR

TWENTY YEARS OF SERVICE TO THE WELDING INDUSTRY

General Electric says, "Congratulations!" to Machinery and Welder Corporation, distributors of G-E welders, electrodes and accessories.

For twenty years, G-E engineers have co-operated closely with Machinery and Welder in applying welding to various manufacturing processes. Together, General Electric and Machinery and Welder have served the welding industry promptly, efficiently and progressively.

And G.E. is also proud of all of its many other fine distributors throughout the country who carry G-E welders, electrodes and accessories—everything you need for welding. Find your G-E welding distributor in the list below, and see his complete line of a-c, d-c and Inert-Arc welders, over 70 different types of production-proved electrodes, and improved accessories from electrode holders to helmets. You can find his address by looking for General Electric under "Welding Equipment" in the yellow pages of your telephone directory.

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Alabama—Birmingham: Young and Vann Supply Co., Alabama Oxygen Co.; Mobile: Turner Supply Co.
California—Fresno, Los Angeles, Oakland, Sacramento, San Diego, San Francisco, Ventura: Victor Equipment Co.
Colorado—Boulder, Colorado Springs, Denver, Durango, Ft. Collins, Ft. Morgan, Greeley, LaJunta, Longmont, Pueblo: Hendrie & Bolthoff Co.
Florida—Jacksonville, Miami, Orlando, Tampa: Cameron & Barkley Co.
Georgia—Atlanta: Welding Supply & Service Co.; Augusta: Marks Oxygen; Macon: Georgia Oxygen Co.
Idaho—Boise: Olson Manufacturing Co.
Illinois—Chicago, Moline, Peoria, Rockford: Machinery & Welder Corp.
Indiana—Evansville: Drill Master Supply Co.; Fort Wayne, Indianapolis, Richmond: Sutton-Garten Co.; South Bend: Perry Welding Sales & Service.
Iowa—Des Moines: Machinery & Welder Corp.
Kansas—Wichita: Watkins, Inc.
Kentucky—Harlan: General Electric Supply Corp.; Lothair: Mine Service Co.; Louisville: Reliable Welding Co.; Paducah: Henry A. Petter Supply Co.; Pikeville: Big Sandy Electric & Supply Co.
Louisiana—New Orleans: Equitable Equipment Co.; Opelousas: Daigle Welding Supply Inc.
Maryland—Baltimore: Arcway Equipment Co.
Massachusetts—Boston: New England G. E. Welding Sales; Fitchburg: New England G. E. Welding Sales
Michigan—Detroit: Welding Sales & Engineering Co.; Grand Rapids: Miller Welding Supply Co.
Minnesota—Duluth: W. P. & R. S. Mars Co.
Mississippi—Jackson: Jackson Welding & Supply Co.
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Montana—Butte, Great Falls: Montana Hardware Co..
Nebraska—Lincoln: Lincoln Welding & Supply Co.; Omaha: Baum Iron Co.
New Jersey—Newark: Welding Sales Corp.
New Mexico—Albuquerque: Industrial Supply Co.; Carlsbad, Hobbs, Las Cruces, Roswell, Silver City: Car Parts Depot, Inc.; Clovis: Bowen Welding Supply; Hobbs: Western Oxygen Inc.
New York—Buffalo: Welding Equipment Sales Co.; Syracuse: Welding Engineering & Equipment Co.
North Dakota—Fargo: Dakota Electric Supply Co.
Ohio—Akron, Cincinnati, Cleveland, Dayton, Mansfield: Burdett Oxygen Co.
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Oregon—Eugene, Portland: J. E. Haseltine Co.
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South Carolina—Charleston: Cameron & Barkley Co.; Columbia, Greenville: Welding Gas Products Co.
South Dakota—Deadwood: Hendrie & Bolthoff Co.
Tennessee—Chattanooga, Knoxville, Nashville: Welding Gas Products Co.; Memphis: Delta Oxygen Co., Inc.
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GENERAL ELECTRIC

7124

...after nine years steady use

STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #18 Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

practically no maintenance expense...

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

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SERVING THE METAL INDUSTRY SINCE 1905

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SEE SILVALOY WORKING EXHIBIT BOOTH G-240 DETROIT METAL SHOW OCTOBER 15-19th! AT MICHIGAN STATE FAIR GROUNDS — DETROIT
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NEW! This 48-page, pocket-size, fully illustrated book is an easy-to-read-and-understand manual that will tell you everything you want to know about low-temperature silver brazing, brazing alloys, joint designs, preforms, plymetal, fluxing, heating methods, cleaning and inspection. There are also many useful reference charts, including Specifications for Silver Brazing Alloys, Check list of Government Specifications, Conversion Data, Brazing Alloy Quantities by Weight, a graph to determine thermal expansion of metals at silver brazing temperatures, etc.

This book is a complete and compact library of brazing data that every design and production engineer—every brazing technician and buyer of brazing materials should have! It is the most complete guide you can get to all aspects of silver brazing applications and problems.

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THE AMERICAN PLATINUM WORKS

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NOTE: IF EXTRA COPIES ARE DESIRED FOR BRAZING PERSONNEL PLEASE SEND REQUEST ON COMPANY LETTERHEAD.

COUPON

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Gentlemen: Please send me a copy of "A COMPLETE GUIDE TO SUCCESSFUL SILVER BRAZING." I understand this will be sent without cost or obligation.

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and Still Big News!

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MALLORY

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"3864 welds and still in operation, compared to 1200 welds with other electrodes."...."167% increase in number of welds."...."10 times more welds on NAX steel."...."18,000 welds, compared to 7200 obtained with electrodes formerly used, and no dressing required."

Unsolicited testimonials from satisfied users prove that Mallory Fluted Electrodes are making sizeable contributions to resistance welding economy. Savings from 10% to 600%—depending on the application—continue to make news. Here's why Mallory Fluted Electrodes gain new acceptance every day:

- 70% increase in the cooling area.
- Faster heat dissipation.
- Positive tube centering.
- Reduced mushrooming.
- No increase in price.

These features mean longer electrode life, less frequent dressing, more uniform welds, more welds per pound of copper and more welds per dollar.

Get complete technical information. Write direct or contact your local Mallory Distributor.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Mallory Fluted Electrodes are available in all standard Mallory nose types, in Elkaloy A** or Mallory 3** metals, with #1, 2 or 3 Morse Taper.

**Reg. U.S. Pat. Off.
†Trade Mark

Resistance Welding Electrodes, Holders, Dies, Rod & Bars, Castings, Forgings

P.R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

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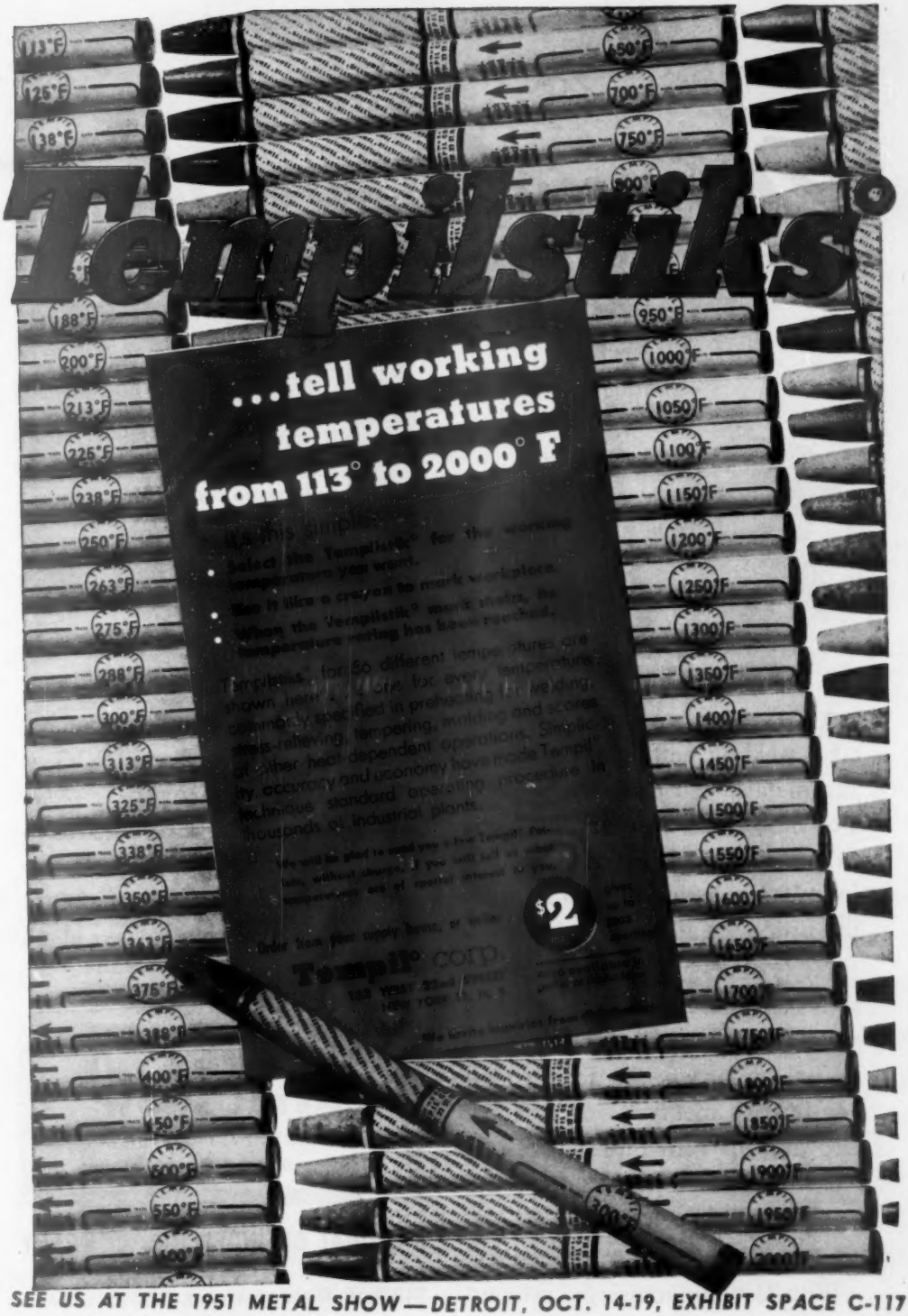


SEE US AT THE 1951 METAL SHOW—DETROIT, OCT. 14-19, EXHIBIT SPACE C-117

All under one tent

NCG®

EVERYTHING FOR WELDING

WHATEVER you may need for welding, cutting or heat-treating metals, you can *rely on NCG.* For more than 30 years the NCG organization has served American industry, speeding up and improving processes at every turn.

NCG's background of experience spans electric arc-welding in all its phases, and the application of industrial gases for working ferrous and non-ferrous metals of every type. Growing up with these processes, NCG has developed ready-to-use machines and materials to get the job done *faster, easier and better.*

With 73 manufacturing plants and a nationwide network of branches and authorized dealers, NCG is able to supply your needs *speedily and dependably.* And NCG's technical assistance in solving your problems, as they arise in your plant or shop, is available to you at all times.

SEE US AT THE METAL SHOW

DETROIT . . . . . OCT. 14-19

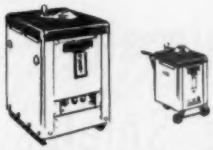
SPACE G-112

NATIONAL CYLINDER GAS COMPANY

Executive Offices:

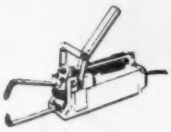
840 North Michigan Avenue, Chicago 11, Illinois

SUREWELD ELECTRODES are made for *every* class, analysis and type of welding. Included in the *complete* NCG line are rods for all oxy-acetylene welding and brazing requirements.

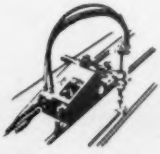


SUREWELD A-C ARC-WELDERS have *exclusive* features not found in other machines. Rugged, dependable, they are unmatched for dollar-for-dollar *value* and real *performance*. *Nine* Industrial Models and *five* Shop Models.

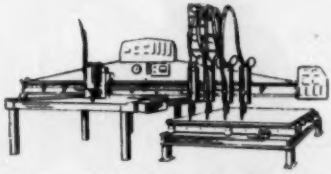
SUREWELD PORTABLE D-C ARC-WELDER. This Model HGW-150 is the lightest weight, *most portable* gasoline-driven arc-welder ever built. It can go anywhere, weld *anywhere*.



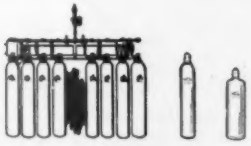
SUREWELD PORTABLE SPOT WELDER with new lock-tight lever action makes tight, perfect spot welds *with amazing ease*.



NCG's "CUT-O-MATIC" is a *portable*, motor-driven flame-cutting machine that is winning wide use in both big plants and small shops.



NCG CUTTING MACHINES of *all* sizes and capacities are *superior* for speed, accuracy and economical operation.



NCG GASES including oxygen, acetylene, hydrogen and nitrogen are supplied in individual cylinders and in manifold systems and other forms of bulk supply to meet required volumes. Countless hours of production time have been saved by properly *planned* supply and distribution systems for these gases.

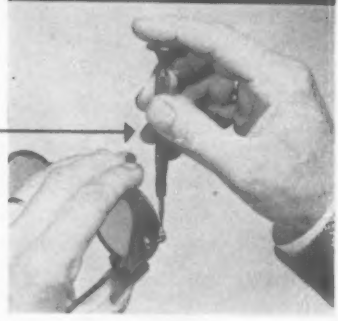
TORCHWELD ACETYLENE GENERATORS are available in portable and stationary models in sizes from 12-lb. to 600-lb. Dependable SHAWINIGAN CARBIDE is distributed by NCG branches and dealers from coast to coast.

NCG ACCESSORIES include all the items the welder needs to work more efficiently and comfortably . . . *a complete line to meet every need.*

TORCHWELD AND REGO *set the pace* for speed, stamina and efficiency, and include all required regulators, welding and cutting torches, tips, and complete outfits.

NEW WELDER'S GOGGLE with Adjustable and Removable Side Shields

Safety Goggles



The leather side shields of this new goggle are *adjustable* to assure a close, comfortable fit so that no part of the eye area is exposed to danger. Being *removable*, also, the side shields can be cleaned or replaced by simply loosening the end piece screws. With Calobar lenses, the 3081A Goggle is recommended for welders' wear under helmets, welders' helpers, supervisors, apprentices — anyone in the vicinity of electric welding — furnace men, molders, brazers and others. With clear lenses, the 3081A is recommended for front and side impact protection when chipping, grinding, riveting, spot welding and on hand tool and machine operations. Your nearest AO Safety Products Representative can supply you.

Remember, whether the hazard is particles from the work, glare, heat, ultraviolet or infared, cinders, dust or wind there is an AO Goggle that meets the need.

QUICK FACTS

- Side shields of soft leather for comfort. Protect against heat, harmful light, flying particles.
- Sturdy cylinder bridge and reinforcing bar covered with leather.
- Temples are On-Center, easily adjusted, perspiration proof, insulated. Both temples and endpiece screws are AO patented "Ewertite" construction. They *keep tight.*
- Endpiece is streamlined — wide bearing surface minimizes temple drop. Screw heads countersunk—won't snag.
- Lenses are Super Armorplate or 6 Curve Super Armorplate in medium, dark or extra dark Calobar shades. Also available in clear Super Armorplate or clear 6 Curve Super Armorplate. When ordering, specify type of lens and shade.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

CADDY

Type A Electrode Holder

NEWEST DEVELOPMENT IN ARC WELDING ACCESSORIES.

SEMI-INSULATED
300 AND 500
AMP. CAPACITY

Cutaway showing CADWELD connection and spring assembly

Cadweld Cable to Stud

Taping Completed Weld

THE **CADDY** holder features the welding cable connected by the

CADWELD PROCESS

Twin designed by engineers with years of welding "Know-how", the **CADDY** holder is:

1. Designed for comfort of the welding operator.

- **SPRING ASSEMBLY** engineered to give a uniform pressure when inserting or ejecting electrodes.
- **HANDGUARD** protects the welder's hand from spatter, arc and reflected heat.
- **COOLER**—Greater heat dissipation by a newly designed channel construction of the body gives twice the surface area yet retains maximum strength.

2. Designed for mechanical and electrical efficiency.

- **CONNECTION** of the cable to the stud by the CADWELD PROCESS gives solid copper circuit from welding machine to electrode holder—no hot spots.
- **REPLACEABLE STUD**—After cable is worn and ready to be changed-out, the old cable with stud attached may be cut off and the cable **CADWELDED** to the new stud.
- **DEEPLY GROOVED JAW** for maximum rod grip.
- **ENCLOSED COIL SPRING ASSEMBLY**, completely protected inside the handle—no chance of damage by arcing or spatter.
- **EXTRA LARGE HINGE PIN** outwears the normal pin and does not permit the usual play of the tong after long hours of continuous operation.

Write for Bulletin #415

Caddy Electrode Holder on Display at Metal Congress—Booth H159

ERICO PRODUCTS, INC.

2070 E. 61st PLACE • CLEVELAND 3, OHIO

THAT P&H AC WELDER LOOKS GOOD TO ME, JIM. WE CAN GET IT OFF THE FLOOR —AND HAVE MORE ROOM TO WORK!
THAT'S RIGHT, BILL— AND WITH CONTROL AT THE WORK WE GET MORE DONE, AND DO IT BETTER!

Save floor space, cut welding time for more production at lower cost

. . . . use P&H AC Arc Welders with exclusive Dial-lectric remote control

Give yourself more room for your production needs. Mount your P&H Welder off the floor, out of the way.

Dial-lectric remote control lets you do this. Your operator can turn the heat on *at the work*. It also cuts down his "walking time" . . . turns it into *welding* time for increased output.

Besides saving space P&H Dial-lectric control eliminates cores, coils, sprockets, gears and other moving parts that cause excessive maintenance and downtime.

P&H AC Welders are available in a full range of sizes up to 625 amps. See your P&H representative or distributor for full details on how this outstanding welder can save you time and money.

Specialized Training

Metal Welding Fabrication

1 week to 18 months

Harnischfeger Welding Training School

in conjunction with

Milwaukee School of Engineering

Write to P & H today for further details

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Welding Division

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MILWAUKEE 14, WISCONSIN

P&H

WELDING DIVISION
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Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer • Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-assembled Houses

2257

Longer Life

with COLMONOY hard facing

All the industries report longer equipment life after hard facing with COLMONOY

COLMONOY hard facing shows the way to longer life for your equipment and machine parts. No matter what the cause of wear, COLMONOY has the answer to restore worn parts and protect your new parts. You'll find protection against abrasion, corrosion, and impact in its complete line of hard facing alloys. To suit your needs and facilities, COLMONOY is available in the form of rods, electrodes, paste, powder, metallizing wire, and castings. COLMONOY offers other advantages:

Easy to apply Any weldor without special training can pick up COLMONOY and do a good job. No danger of expensive rejects. COLMONOY reduces welding time on every job.

Lower welding temperatures Lower temperatures means less chance of part distortion. You save on gas or welding current, too.

THE SPRAYWELD PROCESS Powdered COLMONOY can be sprayed and then welded to the part. Spraywelding uses less material and is faster than hand-welding. A Sprayweld surface is smooth and can be held to within .010". No patching or rejects. Write for more information.

Complete engineering data for applying COLMONOY on typical jobs in any industry available on request.

Branches—Long Island City, Buffalo, Chicago, Houston, Los Angeles, Montreal

AGRICULTURE

Plow shares treated with Colmonoy sweat-on paste hold their edges and last up to 17 times longer.

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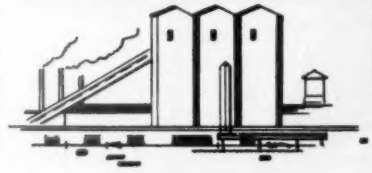

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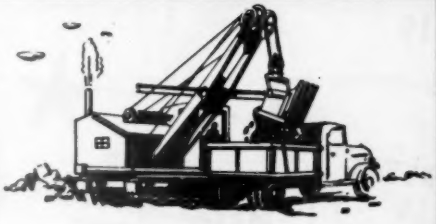

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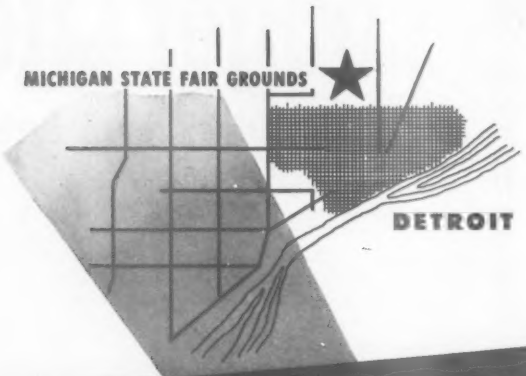

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RULES:

1. The program is open to all persons qualified to present basic principle, theory or the results of practical research and application in the field of non-fusion "lower melting temperature" filler metals in welding, except employees of Eutectic Welding Alloys Corporation, its advertising agencies and members of their families.

2. Participants may submit welding papers on one or more of the following subjects:

   (a) Oxy-acetylene, low melting filler
   (b) Oxy-fuel gas, low melting filler
   (c) Brazing and bronze welding
   (d) Silver alloy filler metals
   (e) Soldering filler metals
   (f) Hard facing and resurfacing with a low melting filler
   (g) Lower melting filler metals for metallic arc, inert arc and carbon arc applications

The welding applications may be torch, furnace, induction, carbon arc, inert arc or metallic arc.

3. Papers must consist of not less than 1000 words, exclusive of drawings, specifications, tables, etc.

4. Manuscripts should be typed in English, double spaced on 8½"x11" white paper, with any tables, charts or drawings on separate sheets.

5. Papers should be confined specifically to the fields defined above and may be documented with photographs, charts, drawings, tables or test data.

6. All papers must be the original, previously unpublished work of the participant and must bear his name, address and business or professional connection.

7. Papers will be judged by the Jury and Committee of Awards on the basis of the merit of the theory or practice presented. Decisions of the judges will be final. All entries and ideas therein become the property of Eutectic Welding Alloys Corporation, and none will be returned.

8. The competition opens October 1st, 1951 and closes June 30th, 1952 midnight. All entries must be postmarked on or before that date.

9. Winners of awards will be notified by mail within approximately 60 days after the close of the competition. Complete list of winners will be sent to all participants requesting it.

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Papers should be submitted to:
Prize Competition and Program of Awards,
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172nd Street at Northern Boulevard, Flushing 58, New York.

Two "Georgia Tech" men win EUTECTIC'S 1950 competition

J. M. MARTIN (right) and C. L. Ramsey (below), both of the School of Chemical Engineering, Georgia Institute of Technology, shared First Prize in last year's competition, heading a list of seventeen award winners.

EUTECTIC WELDING ALLOYS CORP.
172nd Street and Northern Blvd., Flushing, New York
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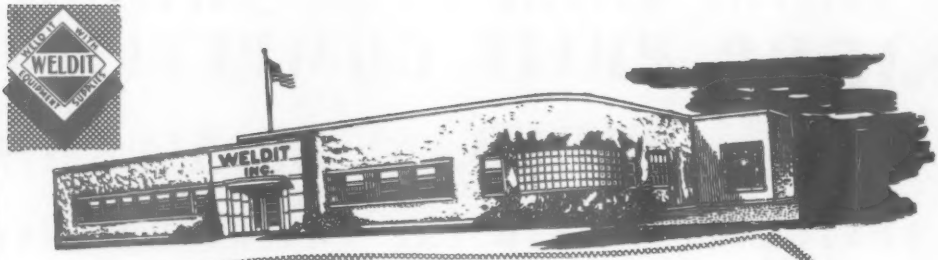

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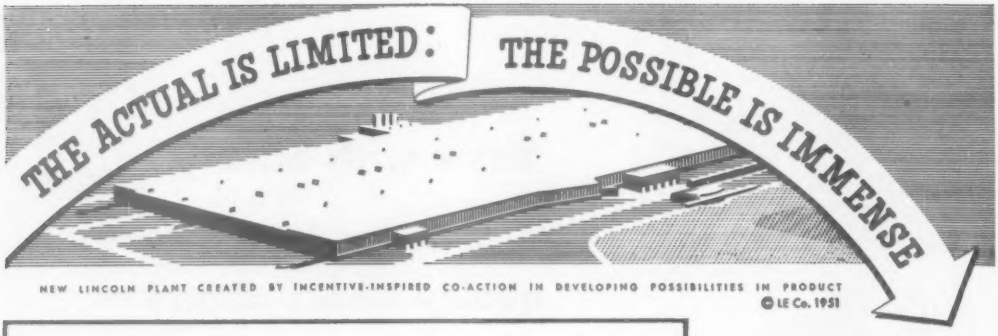

NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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STEEL IS TWICE AS STIFF
. . . achieves equal rigidity with half the material

CONTRARY to erroneously preconceived notions, steel is twice as rigid as iron. In the simple demonstration shown in Fig. 3, a bar of steel deflects only half as much as a bar of iron stressed under equal load.

When designing a machine component for equal stiffness with steel, weight generally should be cut 50% or more. Otherwise, the design has not been developed far enough to fully utilize the superior physical properties of steel.

Welded steel has several additional benefits that improve product durability. Steel is 3 times stronger . . . has four times the resistance to fatigue. Steel is also ductile . . . withstands impact and shock without fracturing.

Your Lincoln Welding Engineer will gladly demonstrate how to apply these basic, cost-saving advantages to your products. Write The Lincoln Electric Co., Cleveland 1, O.

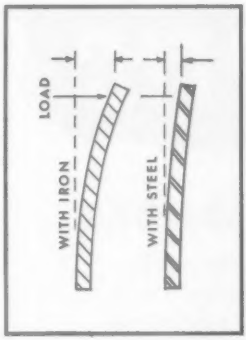


Fig. 3—Steel deflects only half that of iron *under equal loading. 50% of the material is generally required to duplicate stiffness.*

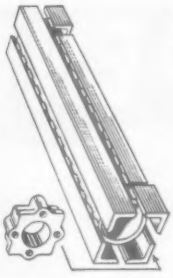


Fig. 5—Maintains alignment *to within .005" on this 120" long machine frame member. Machining time was cut from 8 hours to 2¼ hours and 170 pounds of metal saved on each frame member.*

Fig. 4—Design in steel cuts deflection 80%. *Originally the top for this planer deflected .070". With the present, welded steel construction, the deflection is only .014". Weight has been reduced from 410 pounds to 320 pounds.*

WELDED DESIGN ALWAYS IMPROVES PRODUCT AND LOWERS COST

Welded Steel Design

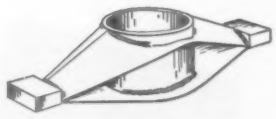


Fig. 1—Increases Rigidity 200% *by redesigning this End Bearing Bracket to welded steel. Cost is cut from $1.52 to 75 cents over construction shown in Fig. 2 . . .* a saving of 51%.

Original Design

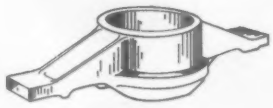
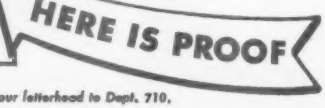


Fig. 2—Original Construction *required 87% more metal than present welded steel design. Initial weight was 3¾ pounds . . . welded steel design (Fig. 1) weighs only 2 pounds.*



Machine Design Sheets are available to designers and engineers. Simply write on your letterhead to Dept. 710,

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 1, OHIO

ESTABLISHED 1916 THE WELDING ENGINEER OCTOBER, 1951

Where Is It All Going?

ONE OF our welding distributor readers has asked us a good question. He wrote: "We hear reports that electrode production is going up. If that is the case, where is it going?"

A very good question: where?

According to our figures, electrode production is up. For the first six months of this year, it was up 41% over the corresponding period of last year. Yet our inquiring welding distributor, who, by the way, is located in an important defense area, tells us that during the past nine months he has been getting only 40% of the electrodes he received a year ago.

A distributor in a defense area undoubtedly has many big customers who are working on defense contracts. He should be supplying them with more electrodes than he did a year ago. On the basis of an equitable distribution, he should be receiving at least 140% of his last year's sales. Yet he is only able to get 40%. To paraphrase Hamlet, something would appear to be stinking in Denmark. Undoubtedly there's a hoarder in the woodpile.

Continually, this big, purposeful and sometimes badly confused nation of ours is seeing the results of cross-purposes in its defense effort. We have not been able to run down the fact that our military forces are hoarding electrodes, but we do know that there is an excessive stockpiling of some materials. Critical materials are even being wasted because of the tendency of the military mind to cling to tradition.

As an example of the above, let's take the military tank. The tank is a welded structure because battle experience proved the welded tank to be vastly superior to riveted tanks—the death traps of the early days of our entry into World War II. To weld a medium tank requires about 1,100 lb of electrodes.

To weld armor satisfactorily, the Ordnance Department feels, it is absolutely essential to use an electrode of austenitic stainless steel containing high percentages of such critical elements as chromium, nickel and molybdenum. About 35% of the core metal is made up of these critical alloys.

We are remembering that the Navy Department has recommended a ferritic electrode for the welding of similar armor. Though this electrode contains only 2½% of critical alloys it does a wholly satisfactory welding job, says the Navy.

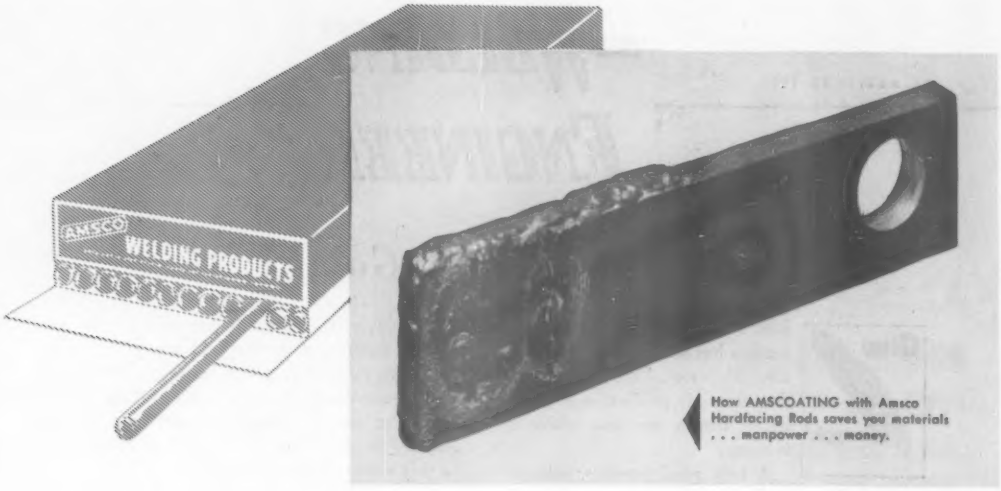
THE Navy's ferritic electrode should be tested for the welding of tank armor. It might do the job adequately, who knows? Just a little extra headwork on the part of the Ordnance Department might make available a lot of stainless-steel electrodes to do jobs for which there is no substitute.

There are many things about our defense efforts that don't make sense. For instance, I have been told that during the last war the Navy bought paint enough to paint 10,000 battlewagons the size of the "Mighty Mo." Kinda looks like another hoarder—and on no tiny scale!

I also learned that only recently the Army purchased 68,000,000 can openers—enough to give 34 can openers to every man in the Army from private to five-star general. If can openers can be hoarded, then maybe welding electrodes can be too. However, there's no way of telling as we don't have any reports yet on the quantities of welding electrodes that the Army has ordered.

What we do know is that it's rather difficult to do a good job when they won't give you the materials to work with. The ancient Hebrews found this out back in the days of Moses when they were forced to make bricks without straw. Our present overseers seem to be just about as shortsighted as the Hebrews' Egyptian taskmasters. We are supposed to prepare for defense without welding electrodes—and this while critical stainless steel is being wasted and critical copper, aluminum and other metals are shipped to Europe by ECA without any embarrassing questions being asked.

Where is it all going? We'd like to know.



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Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

This AMSCOATED Pulverizer Hammer has cut replacements over 90% to date!

Big savings are bound to result when you can reduce shutdowns and replacements. For example, coal pulverizer hammers in a Southern plant were lasting about 5 days before a complicated dismantling job for replacement was necessary. Some hardfacing methods had been tried, but the results still weren't good enough to bring costs down to earth.

Recently test hammers were AMSCOATED with an Amsco Rod specially developed for this type of service . . . and the hammer you see above is now making service life history! Why?

The plant superintendent reports that the AMSCOATED hammers are lasting 14 times longer than plain hammers . . . over twice as long as hammers hardfaced by any other method tested . . . that they've been in service 72 days and are still going strong!

This actual example is one of many AMSCOATING applications that are resulting in *lower* maintenance and replacement costs. . . . *higher* production. Write today for catalog on dollar-saving AMSCO rods and the name of your nearest AMSCO distributor.

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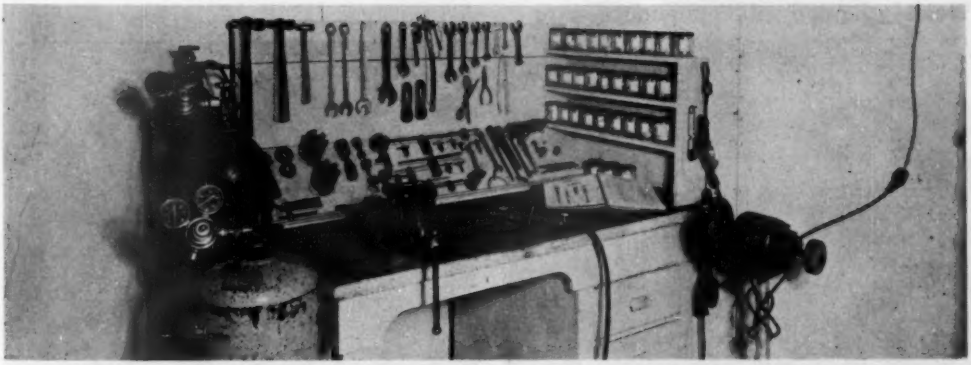


REPAIR AND MAINTENANCE jobs are much easier if the right tools are in the right places when they're needed

Welding Equipment Maintenance

BY T. B. JEFFERSON

THE PUBLIC has by now learned that welding affords an excellent means of maintaining equipment at a minimum of expense. In particular, the factory worker and the farmer have learned that replacement parts fabricated by welding or broken parts repaired by welding will often give better service and longer life than purchased replacements.

Welding is the first thing thought of about the home when Junior's bicycle or Sis' trike is broken. Mother has had the damaged automobile fender welded, and hopes Dad won't learn about it. Dad himself has just had the lawn mower welded last week. And so it goes.

There is a proverb to the effect that the shoemaker's children often go unshod. It applies to those who do maintenance welding because they very often neglect to maintain their own welding equipment. Welding equipment replacement parts are just as scarce, in some instances more scarce, than the replacement parts required by the customers of the welding shop.

Because welding equipment maintenance is all too often one of those things that is taken for granted when real thought should be devoted to it, the editors of THE WELDING ENGINEER offer this special section. It consists of three articles covering, respectively, the maintenance of arc, resistance and gas welding equipment.

The problems of maintenance as related to arc-welding equipment are simple, provided care is exercised in the operation of this equipment. As is pointed out, lubrication is vital in prolonging the life of any rotating machine, including motor-driven welding generators. Dust and dirt are enemies that must be sought out and conquered. But why go on? You can read the article for yourself, beginning on page 34.

The subject of resistance welding is being treated with preventive maintenance primarily in mind. Repair of a resistance welder or its electronic control is usually a job for experts, but it is often possible to eliminate trouble before it can arise by regular inspection programs. This article tells you the chief things that should be done. The overall problem of maintaining resistance-welding equipment is greatly simplified by religiously following a program of preventive maintenance.

The third article of the series, dealing with gas-welding equipment, tells about special tools designed to simplify the problem of repairing torches, regulators, etc. While some of the tools described were made to fit a particular make of equipment, there is no reason why ingenuity cannot be used to develop similar tools for any brand of gas welding equipment.

Some equipment is difficult to maintain because it is manufactured that way. All of us who have been driving cars for many years have seen the engine become more and more inaccessible to owners who want to be their own mechanics. In the production of welders, however, manufacturers have generally improved their designs with the thought in mind to make maintenance easier and the items which need maintenance more accessible. Special tools are often made to simplify the jobs that must be done most frequently.

In many instances good housekeeping will reduce the maintenance needs around a shop. Welding equipment should be kept as free from dirt, oil and dust as is possible. Welding accessories that are not in use should be returned promptly to their racks or to the tool crib. Welding machines and control cabinets should be dusted at regular intervals. At the end of each shift, the welding equipment should be wiped clean and the working area put in order.

Preventive maintenance—those little repair jobs that prevent major breakdown—plays an important part in the maintenance of welding equipment. It must not be neglected. A torch tip kept clean by the occasional use of a tip cleaner is not so apt to burn up. Such simple jobs not only save the equipment owner money, but they enable his operator to do better jobs of welding.

It has long been said that a man can do no better than the tools with which he has to work. At all times, and particularly when our nation is in a period of making itself strong, we must do all within our power to maintain properly our own tools of welding.

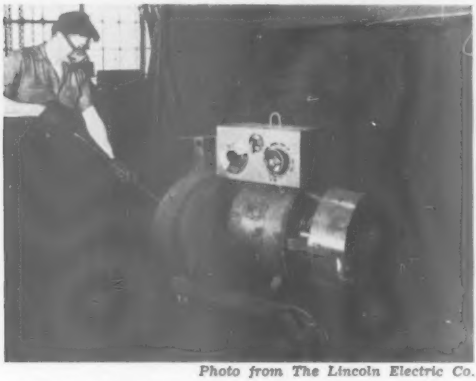


Photo from The Lincoln Electric Co.

KEEP WELDERS clean. This picture shows proper way to blow out dust from d-c welder with compressed air

Photo from General Electric Co.

GREASE GUNS should be used on bearings lubricated by pressure relief. The grease should be added slowly

How To Prevent

This little article may prove to be the most profitable one you have ever read. It tells you just what to do to set up a maintenance program for arc welders.

WHEN you are setting up a preventive maintenance program, there is always the problem of what should be done. The whole idea of preventive maintenance is to correct the conditions that might lead to trouble before trouble actually occurs. To one who has had considerable experience with a particular piece of equipment, this does not present too tough a job. Those who have not had such experience, however, find it difficult to guess how such a program should be started. To give some hints is the purpose of this article.

Plan before You Buy

Your preventive maintenance program on an arc welder should begin even before you buy it. You should know that the machine you are going to buy is the right capacity for what you want it to do. If the welding unit installed is too small or otherwise unsuited for the particular job, a tremendous maintenance problem may arise immediately. Overworked equipment naturally requires considerably more servicing than a welder working on a lighter load or duty cycle.

The manner in which the equipment is installed also bears upon the amount of maintenance that will be required. Naturally, an arc welder located in a dusty, dirty area will have a shorter life than one housed in clean quarters. For this reason, the second thing you should do is to be sure that the welding equipment is housed under as clean conditions as possible.

It's well to be sure that the electric circuit involved will be adequate to withstand the load that will be imposed by the installation of additional welding equipment. Trouble can be expected from inadequate wiring, fuses, circuit breakers and other connecting links in the electrical system. In some cases serious trouble!

Proper grounding is important, whether the welding machine is a-c or d-c. It is possible to weld with a machine not properly grounded, but you are inviting trouble. Adequate grounding will prevent electrical shocks and will insure adequate protection in cases of insulation failures and improper connections.

Actual servicing or maintenance of arc-welding equipment should be the responsibility of some one individual; it should not be left up to the user of the equipment, for it is too easy for him to hope that the fellow on the other shift did the job of servicing. What's everybody's business usually turns out to be nobody's. Under such practice, a machine often misses servicing until it fails. Avoid any chance for the alibi: "I thought Joe did it."

Card Index Important

To do any kind of a preventive maintenance job, you must have service records. Set up a card for each welder to insure that the periodic inspection and servicings are carried out at the proper time. Such a record also provides figures on the maintenance costs of each machine. When the cost figures become too high for a particular welder, possibly the time has come to replace it with a new one.

There are many things that can be learned from a study of well kept service records. These records can tell you if the machine is being abused or misused, and whether or not it is carrying its share of the job load.

Unlike the automobile, the welding machine has no speedometer. It is impossible to recommend what preventive maintenance measures should be undertaken every so many miles of service. It is even difficult to specify that certain servicing operations be carried out every so many hours of service. The only practical method is

Photo from General Electric Co.

"MEGGER" indicates resistance of insulation to leakage currents

Photo from The Lincoln Electric Co.

RESULTS of improperly aligning the "fingers" of a welder starter

Photo from The Lincoln Electric Co.

A-C WELDERS: every six months, blow out dirt with compressed air

Arc Welder Troubles

to specify the operations that must be done weekly, monthly and yearly. Even though a welder may not be used much, it is unlikely that it will be harmed as a result of overservicing.

WEEKLY servicing operations on a motor-generator welder should include:

(1) Blowing out of dust and dirt,
(2) Lubrication,
(3) Inspection of welding cables, ground connections and electrode holders.

MONTHLY preventive maintenance program for the motor-generator welder should also include:

(1) A check of the bearings,
(2) A check of brushes and brush springs,
(3) A check of the commutator.

YEARLY, a motor-generator set should be given a complete overhaul. Both motor and generator should be torn down in order to blow out all the coils and brush coils, air ducts, other spots where dirt and foreign material might accumulate; then blow out these parts again. The coils of both the rotor and stator should be washed down with carbon tetrachloride, then dried out and varnished with a good insulating varnish. Of course, repairs, if any are necessary, should be made to the coils and insulation before the varnishing.

As part of the yearly program, all instruments, controls, resistors and rheostats should be checked and replaced, if necessary, for accurate and satisfactory operation. Likewise, all of the wiring should be checked and all connections checked and tightened. Poor wiring and connections in poor condition should be replaced.

Maintenance of A-C Welders

The maintenance problems of transformer-type welders are fewer than those of the d-c motor-generator set. Possibly a preventive maintenance program for a-c welders could be worked out around a six months' schedule. Every six months the transformer should be blown out to insure cleanliness of the coils and the cooling unit. Connections and coil supports should be checked and tightened. The current-adjustment mechanism should be lubricated, and the cooling fan should also be lubricated. Should the welder have motor-operated controls, it will be necessary to check them between the six-month intervals; otherwise the controls may lag in their function and the gearing become noisy. With such welders, a preventive maintenance program based on three-month intervals of inspection should be instituted.

To get back to the more elaborate preventive maintenance program needed for m-g sets, a few words of caution are in order in connection with the lubrication schedule. To insure that the manufacturers' recommendations regarding the lubrication of bearings are carefully followed, these instructions should be posted in a convenient location near the welder where they will be seen by the maintenance man who does the lubricating.

Remember this: inadequate lubrication and dirt destroy more equipment than any other cause.

When to Lubricate

Many welders are now equipped with so-called "lifetime" bearings, which, under normal operating circumstances, do not require lubrication except after a long period of operation. Operating conditions, however, must be considered in determining the need for lubrication. Welders working under a high ambient temperature or in an extremely dusty atmosphere will require more lubrication than those operating at normal temperatures in clean surroundings.

The weekly lubrication job is confined pretty much to those applications requiring lubricating oil rather than grease. Overlubrication can frequently cause as much trouble as underlubrication. If an anti-friction bearing, for instance, is forced to carry an excessive amount of grease, the heat built up and the constant churning of the grease may cause it

Photo from General Electric Co.

WHEN YOU install new brushes, sand to good fit with commutator

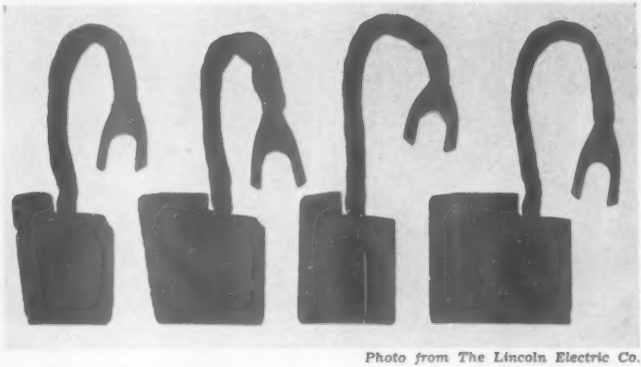


Photo from The Lincoln Electric Co.

TWO BRUSHES at left show effect of improper feeding in holders. Third brush from left should be replaced. Brush on the extreme right looks good

to break down and lose its protective qualities.

A well-lubricated part is sometimes damaged during an overhaul period because of the conditions under which it's stored. A greased part left in the open soon accumulates a quantity of dust and dirt, which produces abrasive wear when the part again goes into service. The remedy is either to store the lubricated parts in a closed container during the overhaul period or clean them well just before putting them back in service.

Brushes and Brush Springs

Probably the most important part of the monthly inspection of the m-g set is the checking of brushes and brush springs. For satisfactory operation, the brushes must be free to move as required in the brush holders, and the pressure caused by the brush springs must be uniform to insure equal current distribution. The brush holder should be set so that the face of the holder is approximately ¼ in. from the commutator. If this distance is increased materially, the brushes may become wedged, resulting in chattering and excessive sparking.

Broken brushes are usually caused by one of two faults: (1) the incorrect grade of brush is used or (2) there is something mechanically wrong with the commutator. Should a welder be subject to repeated brush breakage, it is well to check the commutator for eccentricity, balance and roughness.

When you are inspecting brushes, note their condition and guess how much they will wear down before the next inspection. If a brush looks as though it wouldn't last another month, replace it. If you do not, commutator damage is likely to result. When you replace brushes, be sure that the correct grade of brush for the specific operation is used. The welder manufacturer usually provides information as to the correct grade of brush with the machine. If such information is not at hand, check with the manufacturer's nearest distributor.

During brush inspections, care should be exercised to see that the brush is replaced in the same holder in its original position. This is necessary since the brush has assumed the contour of the commutator for that particular spot. If you put it in a different holder, it may result in a poor contact or in excessive wear to both the brush and commutator.

New brushes should be carefully fitted to the commutator. This can be done by sandpapering the curve of the brush until it is the same as that of the commutator. Care should also be taken to see that the brush pigtails are fastened securely so that the current will not overheat the brushes or the brush holders.

Proper adjustment of the brush springs is equally important. If excessive pressure is placed upon the brushes, it will lead to commutator wear and excessive sparking. As a result of the sparking, heat is built up in the brush, which may anneal the springs. Heating from other sources may also result in annealed springs, which are weak and should be replaced for satisfactory operation. Cases of heating, therefore, should be investigated.

Even though a welder has been given the best of care, there will probably be times when it fails to function properly. For such occasions the trouble-shooting chart on page 37 will be of help. It lists the common troubles, gives the probable causes and tells what to do about each of them.

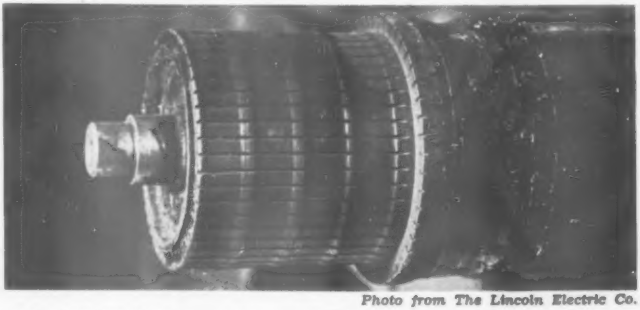


Photo from The Lincoln Electric Co.

BADLY GROOVED commutator was caused by improper contact with brushes

Tips on Troubleshooting. What to Do if ---

If starter won't operate

¶ Power circuit may be dead. Check voltage.

¶ Power lead may be broken. Repair.

¶ Supply voltage may be wrong. Check against nameplate.

¶ A power switch may be open. Close it.

¶ A fuse may be blown. Replace it.

¶ Overload relay may have tripped. Let the welder cool and remove the cause of overloading.

¶ An open circuit to starter button. Repair.

¶ Operating coil is defective. Test and replace.

¶ There is a mechanical obstruction in the contactor.

If welder won't start though starter is operating

¶ Motor connections may be wrong. Check connection diagram.

¶ Supply voltage may be wrong. Check.

¶ Rotor is stuck. Try turning it by hand.

¶ Power circuit has become single-phased. Replace fuse or repair open line.

¶ Starter has become single-phased. This calls for a check of the contact tips. See that all fingers on starter make contact when closed.

¶ There may be a poor motor connection. Tighten it.

¶ An open circuit in the windings. Repair.

If welder starts but blows a fuse

¶ Fuse is too small. Replace with fuse two to three times rated motor current.

¶ Short circuit in the motor connection. Check starter and motor leads for insulation.

If welder won't hold current setting

¶ Commutator may be rough or dirty. Clean and true.

¶ Brush grade may be wrong. Replace brushes.

¶ Brushes may be worn down. Readjust or replace.

¶ Brush pigtails may be damaged. Replace brushes.

¶ Brushes may be in backwards. Reverse. Or not properly fitted. Sand them to fit.

¶ Brush springs may have lost tension. Readjust or replace weak and broken springs.

¶ Field circuit may have variable-resistance connection or an intermittent open circuit. Check field current of main generator and exciter with ammeter.

¶ Electrode or ground connection may be loose. Or you may have a poor ground. Tighten loose connections and check ground-return circuit.

¶ Field rheostat or tap switches may be making poor contact and overheating. Inspect rheostat. Clean and adjust finger tension on switches.

¶ Mechanical current-adjusting mechanism may have loose or worn links. Check backlash and play.

If welder runs but soon stops

¶ It may be overloaded. Check load against nameplate.

¶ Duty cycle may be too high. Check time set runs.

¶ Leads may be too long or too narrow in cross-section. They should be large enough to carry the welding current without excessive voltage drop. Check terminal voltage while welder is loaded; it should not exceed 30 volts on small welders or 40 volts on larger machines when they are operating at rated current.

¶ Power circuit is single-phased. Check for one dead fuse or a dead line.

¶ Ambient temperature is too high. When temperature is over 100 F, operate welder at reduced loads.

¶ Ventilation is blocked. Check air inlet and exhaust openings.

¶ Overload relay parts overheat. Renewal parts are recommended.

If welder fails to generate

¶ It may be running the wrong way. Check direction of rotation by manufacturers' instructions or with direction arrow. On three-phase motors, direction of rotation may be changed by interchanging any two leads.

¶ Brushes may be worn or missing. Check to see that all brushes bear on commutator with good tension.

¶ Brush connections may be loose. Tighten.

¶ Exciter may not be operating. Check exciter output voltage wih a voltmeter or lamp.

¶ Field circuit of generator or exciter may be open.

¶ Check for open circuits in rheostat, field leads and field coils. Also check resistors and rectifiers if any. Some machines give low output when fields are open.

¶ Generator may be reversed in polarity due to another machine or incorrect operation in parallel with another machine. Flash the field with a storage battery or another generator, first with one polarity and then with the other, to see if it builds up. Flash exciter field if set has separate exciter.

¶ Series field and armature circuit may be open-circuited. Check with test lamp or bell ringer.

¶ Driving speed may be wrong. Check nameplate rating against actual speed of motor or belt drive.

¶ Dirt may be grounding field coils. Clean and reinsulate coils.

¶ Welding terminal may be shorted. Check to see if electrode holder or welding cable is grounded.

If arc is loud and spatters excessively

¶ Current setting is too high. Check setting and output with ammeter.

¶ Polarity is wrong. Try reversing the polarity or an electrode of opposite polarity.

If arc is sluggish

¶ Current is too low. Check output. Also check the current recommended for the electrode being used.

¶ There is a poor connection somewhere. Check all connections of electrode holder, welding cable and ground cable.

¶ Cable may be too long or too small. Check cable voltage drop.

If touching the set gives a shock

¶ Frame is not grounded. Ground solidly.

If control fails to vary current

¶ Any part of the field circuit may be short circuited or open circuited. Find faulty contact and repair.

Courtesy Ford News Bureau

1—ELECTRODES of multiple spot welder are dressed on a regular schedule that minimizes welder downtime

Courtesy Ford News Bureau

2—MAINTENANCE employee tightens pressure springs on seam-welder drive rolls to assure proper friction

Preventive Maintenance for

Checks at regular inspection periods—daily, weekly, monthly, quarterly—will find weaknesses in resistance welders before they can lead to breakdowns.

THERE is a widely held but mistaken belief that maintenance is needed only where there are moving parts: the faster they move the more they require maintenance. On this basis, the motion of a spot welder is relatively slow and the same is true of butt and flash welders. Hence such machines are often neglected from a maintenance standpoint. Seam welders with their rotating welding wheels and gears may fare somewhat better. However, the need for maintenance simply cannot be gaged by the amount of motion involved.

An electronic circuit may have no moving parts at all, yet require a very great deal of maintenance. Look at your radio or television sets—or at the electronic controls that insure precision resistance welding.

Most resistance-welding machines have become highly complicated pieces of electrical equipment. They have switches, contactors and timing devices, all of which require regular maintenance. They also have motors, clamps and fixtures, cooling systems, hydraulic or air systems, electrodes and electrode holders . . . all of which must be kept in first-class order if the expected service is to be obtained.

Preventive maintenance is highly important to the production schedule. Checks regularly made—daily, weekly or monthly—will usually uncover weaknesses before they have had time to lead to breakdowns. Furthermore, while repair of a resistance welder is a job for a highly trained electrical specialist, almost any intelligent worker can be taught to keep it in proper working order.

For the suggestions that follow, we are indebted to the "Maintenance Manual for Resistance Welding Machines," published by the Resistance Welder Manufacturers Association, Philadelphia.

Allocate Responsibility

First, you should prepare charts or instruction sheets to allocate the responsibility of inspection and maintenance. It is customary for the electrical department to have supervision over electrical maintenance such as:

Main contactor settings,

Ignitron operation,

Operation of electronic tubes and relays,

Proper operation of sequence timers,

Condition of wiring, foot switches, transformer insulation,

Proper operation of circuit-breaker safety switches.

The mechanical department will generally have supervision of mechanical maintenance such as:

Replacement of pins, bushings, collars, bearings, head slides, cams,

Repair of retraction and associated equipment,

Repair of lower arms of spot welders,

Replacement or repair of driving mechanism and pressure head of seam welders, except leathers, electro-valves and pressure regulators,

Repairs to air and water piping and conduits,

Cleaning out of cabinets and welders,

Maintenance of air lines, water lines and piston leathers,

Lubrication.

Electrodes and Welding Dies

Operators should never permit welding current to be applied before full electrode force is on the work, nor permit electrode force release before the welding current is cut off.

Electrodes should be frequently cleaned while in the spot welder to remove particles of metal and to keep the tips bright. Removal of electrodes is necessary for reshaping and replacement after reasonable wear. Electrodes, welding wheels, dies or mandrels that have become burned,

Courtesy Ford News Bureau

3—TIMER that fails to function is removed as complete unit and sent to the maintenance electrical shop

Courtesy Ryan Aeronautical Co.

4—OSCILLOGRAPH gives an accurate check of timing cycle and current amplitude of this big spot welder

Resistance-Welding Equipment

pitted or out of shape are a sure source of trouble. Inspect the electrodes or dies at the beginning of each shift to make sure that they are bright and clean.

Electrodes should be cleaned when they first begin to show signs of surface roughness. Do not use a file for cleaning; use emery cloth. Do not use pipe wrenches to remove electrodes from the holders. Ejector-type holders are recommended in order to avoid damage to electrode walls.

Watch the shape of spots constantly. Whenever the shape changes, check the electrode faces and dress or replace electrodes. An ample supply of dressed electrodes on hand will decrease the tendency to operate with worn or distorted electrodes. When you are spot welding aluminum, watch the spots with particular care. If tip pick-up appears, check the cooling system immediately.

Dress electrodes, preferably, in a lathe before they have mushroomed enough to make dressing difficult. Tools are available for redressing spot-welding electrodes to various contours. In aligning operations, use a rawhide or rubber mallet for striking holders or electrodes.

Fig. 1, taken at the Ford Motor Co., Dearborn, Mich., shows a welding maintenance employee dressing spot-welder electrodes, using an air-driven motor equipped with a dressing tool. The particular machine is equipped to make 112 spot welds in operations which weld reinforcements to windshield and back window of a passenger-car roof.

At Ford, electrodes are properly dressed on a regular schedule, thus minimizing possible downtime of the welders. The schedule calls for electrode dressing before the start of each shift and during luncheon periods.

Electrode or die life will be appreciably longer, weld quality consistently higher, if the work is cleaned of heavy grease, oil, scale, dirt and oxide before welding.

Do not use white lead or similar compounds to seal leaking tapers on electrodes. Clean graphite grease may be used for such a purpose.

Do not attempt to dress seam-welding wheels in the welder. Cleaning with emery or other abrasive cloth on a paddle is practicable but requires skill to preserve the shape of the wheel. Wheels that have developed flat spots or holes on the face should be removed and redressed.

In flash welding, be sure that dies are free from scale before the work is inserted. Scale will cause pitting and the rapid deterioration of contacting surfaces.

For insurance against shutdowns, keep on hand a liberal quantity of spare electrodes for instant replacement.

Clamps, work-holding devices, indexing fixtures, etc. must be in first-class mechanical condition if accurate work is expected. Inspect them frequently, and tighten, adjust or repair them as soon as noticeable looseness or wear develops.

Examine all jig, fixture and tooling insulation daily and replace insulation as required.

In Fig. 2, we see a welding maintenance employee of Ford tightening pressure springs on the two drive rolls of a seam welder. This adjustment insures proper friction of the copper driving rolls. Alignment and tension

Ryan Aeronautical Co.

5—HOUSINGS of welder controls must be dusted inside once a week

Courtesy General Electric Co.

6—LUBRICATION of motor, clutch, transmission gears and shaft is as essential to the resistance welder as to any other machine

Courtesy Ryan Aeronautical Co.

7—AIR-PRESSURE systems must be regularly inspected to assure uniform pressure

of the rails which guide the two halves of a gas tank of a passenger car through the seam welding are adjusted at the same time. Maintenance operations of this type are performed on a regular schedule, thus minimizing possible downtime.

Cooling System

Failure of a cooling system to function properly can cause serious damage to a resistance welder. Before welding operations start, the flow of water at the discharge outlet should be checked to make sure that the water is turned on and is circulating properly. Water must be clean and cool—not in excess of 60 F at the inlet. A recirculating system may be used if the supply of clean water is limited.

At the end of each work period and during shutdowns, the water should be turned off to avoid possible damage from leaks or condensation. When welders are to stand idle in an unheated plant during cold weather, the cooling system should be drained and blown out with air pressure.

Replace all hose sections that have become clogged, swollen or broken. When you change, repair or replace hose connections or other water fittings, make sure that the water circuits are the same as those originally furnished.

All water piping to electrodes should be as large as practicable. The inner water tube in spot-welding electrode holders should project to within ¼ in. or less of the end of the drilled hole in the electrode. When you are changing to an electrode of different length, adjust the water tube to the proper height.

Electrical System

Keep connectors of transformer bright and clean. Do not permit oil, grease, water or flash particles to come into contact with the transformer winding, electrical wires or connections.

No repairs to the electrical system should be made except by or under the direction of a competent and authorized electrician.

Switches, contactors, timing devices are the nerve centers that control the operation of the welder. They must be kept in good condition, both mechanically and electrically.

Check them for evidence of wear or faulty adjustment whenever poor timing or excess arcing is experienced. Make a monthly check of worn or loose relay moving parts and repair or replace as needed. Loose or damaged switch or control handles should be repaired or replaced promptly.

Keep an adequate supply of spare electronic tubes on hand. Also an adequate supply of such things as contact fingers and shoes, contact springs, contacts, coils, etc.—relatively inexpensive but perishable parts.

No repairs or adjustments should be made to contactors, timers, switches or other control units except by or under direction of a competent and authorized electrician.

In Fig. 3, a welding machine timer undergoes repairs in the electrical shop of the Ford maintenance department. Electronic sequence welding timers are handled as complete units. If a timer fails to function properly, it is removed as a unit from its control panel and sent to the repair shop. Following completion of repairs and tests, the unit is placed in standby storage. One replacement cabinet provides standby storage space for 15 different types of interchangeable welding timers.

The Ford electrical shop makes repairs on all types of welding timers. It works with such electronic elements as tubes, switches, motors, coils, resistors, starters, relays, rectifiers, fuses, lamps and condensers.

At the Ryan Aeronautical Co., San Diego, Calif., welders on production assignments may be required to make as high as 130 spots a minute. An oscillograph (Fig. 4) is used to check the timing cycle and current amplitude of each Ryan-owned spot or seam welder.

Housings of welder controls must be dusted inside at least once a week. This good housekeeping at Ryan (Fig. 5) eliminates many troubles with delicate circuits.

Welding Equipment Maintenance—Resistance

Before attempting to clean control boxes, make sure that the main-line switch is open. Use a vacuum cleaner or similar device to remove the dust. Compressed air is not recommended for blowing out machine or control cabinets. If it must be used, make sure that the air is dry and that the strength of the blast is insufficient to injure delicate parts or mechanisms.

Air Systems

Many welders operate on air pressure, although some are hydraulic. Notice the reading of the pressure gage from time to time. If the gage air pressure does not agree with the pressure designated for the job being done, tap the gage gently. If there continues to be a deviation from standard amounting to a pound or more, it's a job for the mechanical maintenance department.

Routine inspection of air-pressure systems at Ryan Aeronautical Co. (Fig. 7) assures that uniform pressure will be maintained on each welder.

Keep air valve to main line full open.

If air supply contains excessive moisture, an air filter and trap should be installed in the line.

Keep one complete air-regulating valve, several gaskets and several diaphragms on hand.

Light motor oil will keep leather cup washers soft and pliable.

Lubrication

Proper lubrication of motors, variable-speed drives, clutch and reduction units, transmission gears and shafts, etc., is as essential to resistance welders (Fig. 6) as to any other machine. All moving parts should be oiled and greased at regular intervals to insure smooth, even motion and minimum wear. When you are lubricating, however, watch out to see that you do not drop oil or grease on electrical units or connections.

Check the air-line lubricator at the start of each shift. The lubricator should be kept about half-full and adjusted so that a mist is barely discernible at the valve discharge. Too much oil is nearly as bad as not enough.

Check all enclosed housings with operating parts running in oil to see that a proper level of lubrication is maintained.

Seam-welder shaft bearings should not be lubricated with any standard low-temperature heavy oils. Use a high-temperature light oil especially manufactured for this purpose. If in doubt, consult the manufacturer.

Periodic Maintenance

Here are the things that you should do daily, weekly, monthly, quarterly and annually:

DAILY

Cooling System

Check for water leaks.

Switches, Contactors and Timers

Check all main contactors.

Check all tubes to be sure that they are firing positively and consistently.

Air Systems

Check for air leaks and eliminate them.

WEEKLY

Electrodes

Clean electrode holders and clamps.

Transformer and Electrical System

Remove all dirt, dust and grit from the transformer and secondary circuit. An accumulation of dirt or flash particles can by-pass a considerable amount of current, causing loss of efficiency, high operating cost and even danger of burning out the transformer.

Check the transformer wedgings and primary connections to make sure that the pounding of repeated shock loads has not loosened them. If transformer becomes noisy, it is the result of loose core bolts or wedgings. This should not be allowed to continue because it will get progressively worse —chafing the insulation and eventually causing a complete breakdown.

Switches, Contactors and Timers

Have electrical connections in control box inspected by a competent electrician.

General

Wipe all exterior machine surfaces clean. Clean all readily accessible surfaces, including clamping surface, with steel wool. Also use gasoline, carbon tetrachloride or other liquid which does not attack copper. Shift clamping surfaces, if necesary, for cleaning.

MONTHLY

Cooling System

The entire system should be reverse flushed to remove accumulated dirt.

Transformer and Electrical System

Tighten all electrical connections.

Check arm insulation and repair as needed.

Switches, Contactors and Timers

Clean the screens of the ventilating ducts of the control boxes. This job may be done frequently if necessary.

Clean foot switch, check wiring and replace damaged wiring.

Clean and wipe all high-voltage panels, tube sockets and cables.

Check relay moving parts for looseness and wear.

Air Systems

Check system for leaks, defective packings and piston cup leathers; also the operation of accessories such as regulating valves, speed control valves, etc.

QUARTERLY

Cooling System

Check water hose and connections for disintegration and corrosion.

Switches, Contactors and Timers

Check electro-valve washers and replace them if worn.

Check protective devices for overtime and overvoltage.

Check sequence timer with cycle recorder or oscilloscope and recalibrate if necessary.

Air Systems

Check air pressure gages with a standard gage. Replace any that are sluggish or defective and recalibrate or repair them for future use.

Check air hose and connections for disintegration or corrosion.

Replace air filters. (This may be a monthly job if required.)

Check regulator diaphragms.

General

Take pressure calibration curves.

ANNUALLY

Cooling System

Replace water hose.

Transformer and Electrical System

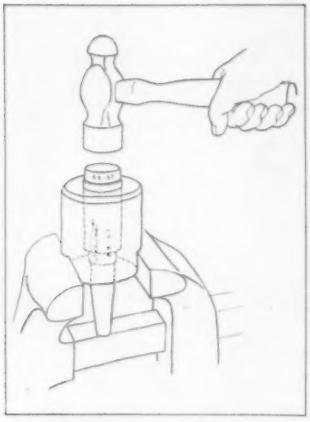
Clean all copper secondary connections with emery cloth and gasoline, carbon tetrachloride, alcohol or other liquid that will not attack copper alloys.

Air Systems

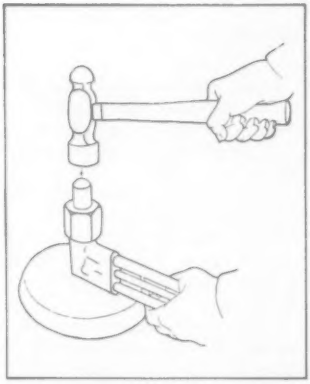
Replace air hose.

General

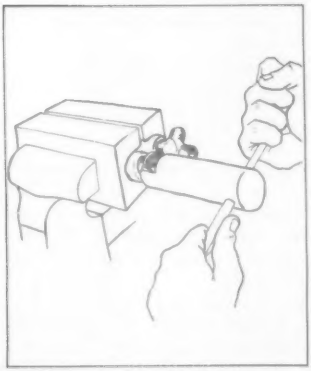
Paint all machinery and panels. At the same time, check for excess wear of trunnions, bushings, etc.



1—HAMMER blow on the plunger reshapes torch tip seating surface



2—ANOTHER repair die simplifies the reshaping of torch head seat



3—REMOVAL of needle valves is facilitated by special vise jaws

The Importance

"Built-in repairability" means profits to both makers and users of tools or equipment. Today, thoughtful design to facilitate maintenance and repair contributes immensely toward conservation of indispensable equipment.

BY GEORGE E. HAMMON
Vice-President and General Manager
National Welding Equipment Co.

NO ONE can estimate accurately the huge annual loss of material and equipment brought about by the twin evils of inadequate design and improper repairs.

Any product made by man is subject to both wear and accidental damage. Since repairs are inevitable, the wise thing is to allow for them in advance. Thoughtful engineering may provide a simple path to good repairs. Accessibility to all parts is important and so is provision for the maximum interchangeability of parts. A product that can be easily repaired will serve better, longer and less expensively. Such products are a necessity in these days when defense production has brought about a scarcity of men, metals and materials.

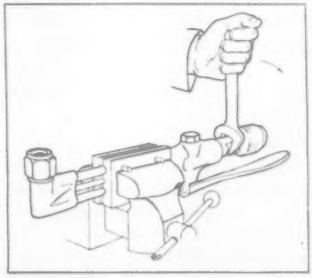
The amazing thing about the activities of many engineering departments is their aloofness to consumers' views and suggestions. This holds true even when the consumers are users of gas welding and flame-cutting apparatus and are no mean engineers themselves. Certainly, their viewpoint ought to be respected. In our company's over forty years of experience, we have become convinced that it pays real dividends to design equipment that will accomplish three things:

1. Weld and flame-cut.
2. Do it over long and trouble-free periods of time.
3. Enable equipment to be repaired with a minimum of replacement parts and specialized knowledge.

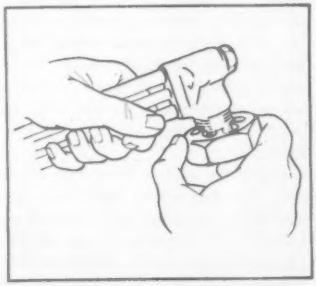
Welding equipment and medical oxygen equipment offer excellent design possibilities. They are made of relatively soft non-ferrous materials, necessary from the service standpoint yet easily damaged. Under our defense economy, copper has become one of the most critical items, and as a result the copper alloys used in building welding and cutting torches have become increasingly difficult to obtain.

Torch Tip Repair

At the same time, oxyacetylene equipment has assumed a new importance, for it is vital to the production of guns, ships, trucks, tanks, aircraft —virtually everything made of metal. How long would our national economy last without the simple flame-cutting tip, for instance?



4—VISE JAWS hold torch without damaging the gas passage tubes



5—THREAD-forming dies are a necessity for torch maintenance

# of Repairability

Let's take a closer look at a flame-cutting tip. It is made of copper and is usually provided with a conical seat. The seat may be damaged by dirt or metal particles, which scratch its conical surface and thus cause gas leaks. A careless operator may drop a tip on a concrete floor. What happens then? Thousands of copper flame-cutting tips are used in industry, and their average price is probably in the neighborhood of $3.50 each. If they are not repairable, it means a lot of dollars are thrown away and a vast quantity of precious copper is discarded. In addition a lot of production time is consumed in producing replacement tips.

Here was a challenge: Make flame-cutting tips more repairable. In considering the "how" of it, the first problem was that of the seating surfaces.

Simple Forming Tool

A rather dramatic repair procedure has been made possible by a redesign of cutting tip seating surfaces to facilitate the employment of a simple reforming tool, Fig. 1. When a cutting tip needs reconditioning, one merely places it into carefully and accurately machined dies and gives the male part of the die a couple of very hard hammer blows. Incidentally, the same repair procedure is applicable to the seating surfaces of the cutting torch head (Fig. 2). By means of the special tool, a swift hammer blow reconditions either the cutting tip or torch seating surfaces.

Should a tip be damaged by external force to the point where the seating surfaces are no longer perfectly round, the damage is reconditioned just as easily. After the damaged cutting tip has been given a reconditioning treatment, it is reinserted in the torch. A test lighting will prove that it neither leaks nor fails to function with the utmost perfection.

This is what is meant by "designing for ease of the ultimate reconditioning."

Needle Valves

Torch needle valves are another source of operating troubles. Needle valves of course, cause trouble to the weldor or the flame-cutter.

To repair a needle valve adequately is usually far more difficult than it sounds, but redesign will often help overcome this situation. A common fault is stem leakage, which may be minimized by a redesign.

When the needle valve does require removal, the operation is greatly facilitated by two useful tools. One is a clamping device (Fig. 4), which will hold the torch firmly between vise jaws without causing tube collapse, and the other one (Fig. 3) is a specially designed needle valve wrench.

Threaded joints, often damaged, can be restored with proper tools. Repairability is obtained by suitable chasing dies, Fig. 5, or, where feasible, thread-reforming tools will simplify this type of repair.

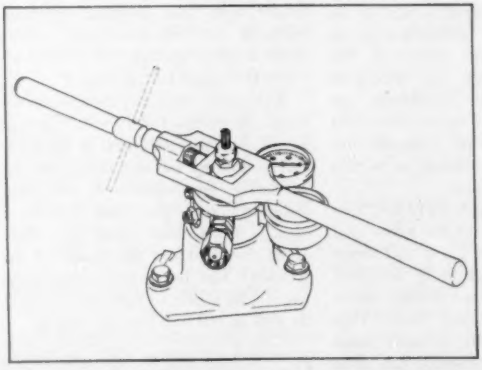
Regulator Repair

Pressure-reducing regulators are generally made of brass or bronze. Here, again, the parts are relatively soft and can be severely damaged if they are placed between unprotected vice jaws by inexpert repair personnel. Once a regulator body or cap has been deformed, it can no longer be relied upon for the exacting service of handling high-pressure cylinder gases.

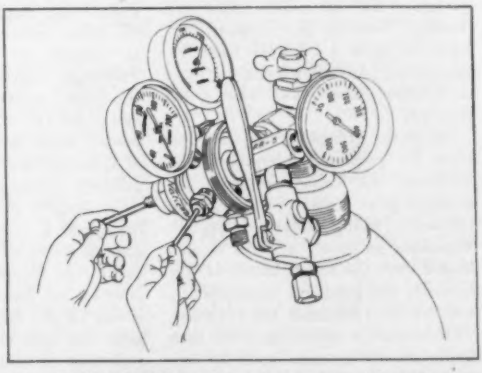
To overcome this difficulty, a special holder has been designed (Fig. 6). It will aid the repairman in doing a much better job in less time and with maximum safety to the regulator parts.

It is not unusual for a regulator to get "banged up." Often a regulator gage breaks off; then we are confronted with the problem of extracting the broken-off gage shank. The convenient "easy out" often expands the walls of the gage nipple, again ruining the reliability of the regulator. Now the problem of extraction has been minimized by the design of a special extracting tool, made in numerous necessary sizes.

This extraction tool offers one outstanding advantage: It will pull the tube walls inward rather than expand



6—SPECIAL TOOLS—a holder and a long-handle wrench—now make it easy to open or close regulator



7—COMBINATION valve-and-gage assembly indicates the pressure of primary stage of a two-stage regulator

SEE HOW EASY it can be to open a regulator with these two special tools (also illustrated in Fig. 6)

REGULATOR is held in a convenient position for repair. Special holder prevents damage to the brass body

them. It is driven into the orifice of a tubing or a drilled out section, and the extracting job is sure and simple.

Cylinder Valve Threads

"Damaged threads" have been the bane of both the manufacturer of cylinder gases, and the men who use them. When a cylinder handler replaces the "valve cap" before the empty cylinder is returned to the filling plant, he may quite easily damage the valve thread merely by dropping the metal cap a bit carelessly onto the valve part. Even though the damage caused is slight, the next recipient of the cylinder may find it exceedingly difficult to attach his regulator onto the damaged valve thread. Then the unlucky recipient must return the cylinder with a loss of time and transportation cost. If he tries to force the thread, as he will probably do, he causes additional damage, resulting in a leakage, perhaps, or even a cylinder valve replacement. (Anyone who has replaced a cylinder valve knows what a job *that* is!)

All of the difficulties may be overcome by a specially designed case-hardened nut, which replaces the bronze nut as a part of a gas manufacturer's filling manifold pigtail. Whenever an empty cylinder is connected onto the filling manifold, the specially designed nut automatically restores the damaged valve thread. This is done by reforming rather than by the removal of metal as in the case of thread cutting.

The interest of the equipment seller in a cylinder valve thread does not stem from the point of view of cylinder maintenance as such, but rather from a very definite desire to protect the regulator inlet connection threads —what we are after is longer regulator life.

Two-Stage Regulators

Two-stage regulators are usually hard to repair. These difficulties are caused by the fact that the actual working pressure of the primary reduction stage is usually difficult to ascertain.

But why should one want to know about the primary stage pressure, anyway? Is it important? Definitely, yes. If the tension screw exerts too much or too little pressure, the primary stage could prevent the secondary stage from working. If there is excessive spring tension upon the primary stage diaphragm, it will block the entire seating mechanism so as to cancel out the effect of the first-stage reduction. So whenever two-stage reduction regulators are assembled (or when repairs are being made), there must be a simple way of knowing what is going on in this primary pressure stage.

To simplify the job, there has been developed a combination valve and gage assembly (Fig. 7). It will screw easily into the place to be occupied later by the pressure-reducing mechanism of the secondary stage. This gage will indicate the primary stage reduction pressure exactly and thus will enable the worker to increase or to decrease the pressure accurately.

Special tools are often necessary and unavoidable but they are not to be recommended when design changes can be made to permit standard tools to take their part. It is obviously best to have a minimum of so-called "special" things of whatever nature to clutter up a repair bench, a stock room, or a tool list. When special tools are needed, they should be designed as carefully as the equipment they are intended to repair. By and large, the preferred system is to design and construct the equipment so that the average reconditioning job may be undertaken with standard tools in the hands of average repairmen.

And now one more suggestion to manufacturers of gas welding and cutting equipment:

After you have succeeded in producing well designed equipment or products, after you have created good repair tools and designed adequate methods for reconditioning, don't spoil it all by getting out difficult-to-visualize repair instructions.

Altogether too many repair instructions are written for the gifted genius who knows precisely how to diagnose the trouble by the symptoms. But remarkably few repairmen are good diagnosticians. What does it avail a man to know about repair procedure if he doesn't know the causes of the trouble? The instruction paragraphs should help him to spot that ailment as well as tell him how to treat it.

For tips on tip maintenance— *see page 82*

Convention Preview

Thirty-second AWS meeting—Detroit, Oct. 15 to 19 — will be featured by many special events including an evening symposium on welding of alloys for jet engines.

BY CLYDE B. CLASON

THE TIME is the five-day period from Monday October 15 through Friday October 19. The place is the Hotel Book Cadillac, Detroit. The occasion is the 32nd annual meeting of the American Welding Society. The advance dope is that it's going to be worth your while to attend.

It's good news that this year's convention will not be so heavily programmed as last year's meeting in Chicago. Last year, as many weary sitters can recall, there were 87 technical papers presented in 24 sessions. This year there will be only 71 papers given in 21 sessions. The technical sessions, however, stretch over eight morning and afternoon periods from Monday through Friday.

One customary event omitted last year—the annual dinner—has been restored to this year's program. However, there will be no Sunday afternoon president's reception. Instead, the president's reception will be on Monday evening. The Adams lecture, traditionally delivered Monday night, has been postponed to Tuesday night. The awards and prizes will be presented during the annual dinner on Thursday evening.

Two Symposiums Planned

Wednesday evening has not been left free. Two events have been allotted to it: the university research conference and a symposium on the welding of jet engine alloys. A second symposium, on filler metal specifications for inert-gas and submerged-arc welding, will be held on Thursday afternoon, a period free from technical sessions. The educational lecture series will also be held this year—the time from 4:30 to 6:00 p.m. on Tuesday and Wednesday. The annual business meeting and board of directors' meeting takes place on Thursday afternoon.

An inspection trip to the plants of the Ford Motor Co. has been arranged for Tuesday morning, affording an excellent excuse for those who don't wish to listen to technical sessions in that period.

The 21 technical sessions will be held Monday morning, Monday afternoon, Tuesday morning, Tuesday afternoon, Wednesday morning, Wednesday afternoon, Thursday morning and Friday morning.

It all adds up to a terrific week.

John J. Chyle, of A. O. Smith Corp., Milwaukee, will give the 1951 Adams lecture. His subject is the welding of copper by the inert-gas metal-arc process, a topic that should hold considerable interest. William R. Plummer, vice-president of the Progressive Welder Co., Detroit, will conduct the educational lectures. No title for the series had been announced at the time of the present writing, but undoubtedly the two lectures will be on some phase of resistance welding.

We'd like to point out that those interested in resistance welding are getting a real break this year. Three full technical sessions and ten of the 71 papers are devoted to this subject. There will also be the opportunity to see resistance welders in action at the Ford Motor Co.

Your New Officers

Since there wasn't any opposition to the Nominating Committee's official slate, all of those named thereon have been elected to office for the 1951-1952 term. The new officers will be:

President: Charles H. Jennings, engineering manager, welding department of Westinghouse Electric Corp., Buffalo.

First vice-president: Fred L. Plummer, director of engineering, Hammond Iron Works, Warren, Pa.

Second vice-president: Eric R. Seabloom, supervisor of field engineering for the Crane Co., Chicago.

All of this trio of aces are more than well qualified for their new posts. Mr. Jennings, active in the American Welding Society for the past twenty years, has served his apprenticeship as first vice-president and second vice-president. He was last year's Adams lecturer and has written more than thirty articles and two books on welding.

Oddly enough, Mr. Plummer is also the author of more than thirty articles and two books. He was an instructor and associate professor at Case School of Applied Science from 1923 to 1937 and later engaged in consulting engineering projects. From 1937 to 1940, he was chief design engineer of the Main Avenue bridge projects, Cleveland, which included a main bridge structure about one mile long with complicated approach structures.

Newly elected officers of the American Welding Society . . .

C. H. JENNINGS
1951-1952 president

F. L. PLUMMER
First vice-president

ERIC SEABLOOM
Second vice-president

E. O. WILLIAMS
Director-at-large

M. S. SHANE
Director-at-large

Eric Seabloom has been interested in affairs of the American Welding Society for many years, serving as a director-at-large from 1943 to 1946, and as vice-chairman and then chairman of the Chicago section. He is a member of the AWS Committee on Awards, AWS-ASTM Committee on Filler Metals, WRC Advisory Committee on Public Utilities Welding Research and has served on the Welding Handbook Committee, ASA Code for Pressure Piping, Technical Committee of the Pipe Fabrication Institute and many other committees.

Mr. Seabloom, who was born in Sweden, entered the employ of the Crane Co. in 1917 as a draftsman in the product engineering department. In 1932 he was given the position of welding engineer and in 1939 was appointed supervising engineer of the engineering laboratories to coördinate the activities of the many laboratory groups. Since 1948 he has been supervisor of field engineering, but welding continues to be his major interest.

Directors and District V. P.'s

The four new directors-at-large are Edwin O. Williams, Michael S. Shane, I. A. Oehler and Robert S. Green. Mr. Williams is a vice-president and a director of the Victor Equipment Co. and has since 1930 been very much identified with the rapid growth of welding in Southern California.

"Mike" Shane will be remembered by everyone who attended the 1949 AWS Convention in Cleveland for the excellent job he did as chairman of the national Convention Committee. He is with the Cleveland Electric Illuminating Co. as manager of the technical studies department.

Dr. Oehler has been with the American Welding & Manufacturing Co., Warren, O., since 1942 and is now director of metallurgy and research of that organization.

Green is associate professor and chairman of the Department of Welding Engineering at Ohio State University. Since he joined the university staff in 1947, welding engineering has been established as a separate degree-granting department of the College of Engineering.

The newly elected district vice-presidents are: Ernest N. Adams, District No. 1 (New York and New England); J. V. Durham, District No. 3 (southern); T. B. Jefferson, District No. 5 (midwestern) and Alexci P. Maradudin, District No. 7 (western).

Mr. Adams is a district engineer of the American Institute of Steel Construction and a past-chairman of the Worcester, Mass., section of the American Welding Society.

Mr. Durham is located in Nashville, Tenn., where he holds the position of principal surveyor of the American Bureau of Shipping.

Ted Jefferson has been editor of The Welding Engineer since 1940 and is also editor of *The Welding Encyclopedia*. He is a national director of the American Welding Society and a registered professional engineer of the State of Illinois.

Mr. Maradudin was born in Russia but came to the United States in 1923 and received his technical education in California. Since 1930 he has been employed by the Standard Oil Co. of California as metallurgist and materials engineer. He is a past-chairman of the Los Angeles section of the American Welding Society.

Technical Program—Monday

The two Monday morning sessions are on structural welding and resistance welding. La Motte Grover, Air Reduction Sales Co., is chairman of the structural welding session and Martin P. Korn, consulting engineer, is co-chairman. Papers are:

Yield strength of welded continuous beams, by C. H. Yang and L. S. Beedle, Lehigh University, Fritz Engineering Laboratory, and H. G. Johnston, University of Michigan.

Column strength under combined bending and thrust, by R. L. Ketter and L. S. Beedle, Lehigh University, Fritz Engineering Laboratory, and H. G. Johnston, University of Michigan.

Estimating weldments and welded structural steel, by Charles F. Frantz, Lehigh Structural Steel Co.

Surface conditioning of structural steel by welding, by R. E. Somers and H. C. Von Blohn, Bethlehem Steel Co.

Jack Ogden, Fisher Body Div. of General Motors Co., is chairman of the Monday morning resistance-welding session, and B. L. Wise, National Electric Welding Machine Co., is co-chairman. Papers are:

Physical and metallurgical characteristics of spot welding titanium, by M. L. Begeman, J. C. Fontana and Frank W. McBee, Jr., The University of Texas.

Application of spot and seam welding to design, by S. P. Jenkins and Thomas E. Piper, Northrop Aircraft, Inc.

Spot and projection welding using magnetic electrode force, by William

I. A. OEHLER
Director-at-large

R. S. GREEN
Director-at-large

E. N. ADAMS
District No. 1 V.P.

T. B. JEFFERSON
District No. 5 V.P.

A. P. MARADUDIN
District No. 7 V.P.

E. Klingeman and H. H. Kruer, Precision Welder and Machine Co.

A case of power, by Myron Zucker, Myron Zucker Engineering Co.; Jerry Geralds, Midwest Wire Products Co., and Paul Duker, of Detroit Edison.

Monday Afternoon

Three simultaneous sessions—resistance welding, weldability and nonferrous—will be held on Monday afternoon. J. Randall, of Ford Motor Co., is chairman of the resistance-welding session, and Dr. R. C. McMaster, of Battelle Memorial Institute, is co-chairman. Three papers will be given:

Seam welding containers automatically, by C. S. Selzer, Swift Electric Welder Co.

Spot and seam welding of Nimonic and similar heat-resistant alloys, by J. Solomon, Sciaky Bros., Inc.

Temperature distribution during the flash welding of steel, by Ernest F. Nippes, W. F. Savage and J. J. McCarthy, Rensselaer Polytechnic Institute.

Clarence E. Jackson, Union Carbide and Carbon Research Labs., is chairman of the weldability session, and R. S. Archer, Climax Molybdenum Co., is co-chairman. Papers are:

Microcracks and the low-temperature cooling rate embrittlement of arc welds in mild steel, by Prof. A. E. Flanigan, University of California.

Effect of subcritical cooling rate on strain and quench aging of structural steels, by C. Felmley, C. Hartbower and W. S. Pellini, Metallurgy Div., Naval Research Lab.

G. O. Hoglund, Aluminum Co. of America, is chairman of the non-ferrous section. I. C. Mattson, Dow Chemical Co., is co-chairman. Papers:

Tensile tests and metallurgical studies of welded copper joints, by R. J. Mosborg, R. W. Bohl, F. L. Howland and W. H. Munse, Dept. of Civil Engineering, University of Illinois.

Welding iron-bearing alpha aluminum bronze, by F. Emery Garriott, Weldrod Dept., Ampco Metal, Inc.

Pressure welding aluminum at various temperatures, by M. A. Miller and G. W. Oyler, Aluminum Research Labs.

Tuesday Morning

Tuesday morning will see the first of two consecutive sessions on ship structure. The only other technical session during this period is on fundamental studies of arc welding.

Captain E. A. Wright, U.S.N. Bureau of Ships, is chairman of the ship structure session. Commander D. B. Henderson, U. S. Coast Guard, is co-chairman. Papers are:

Work of the Ship Structure Committee, by Rear Admiral K. K. Cowart, U. S. Coast Guard.

Low-carbon steel: subcritical heating vs. transition temperatures, by L. J. Klinger, E. B. Evaneskes and William M. Baldwin, Case Institute of Technology.

Studies of tests for evaluating welded ship steels, by C. B. Voldrich and P. J. Rieppel, Battelle Memorial Institute.

Stress studies of bulkhead intersections for welded tankers, by W. R. Campbell, L. K. Irwin, and R. C. Duncan, National Bureau of Standards.

Influence of composition and steelmaking practice upon ship-plate quality, by H. M. Banta, Battelle Memorial Institute.

Dean W. B. Kouwenhoven, of Johns Hopkins University, is chairman of the fundamental arc-welding studies session. R. W. Clark, of General Electric Co., is co-chairman. Papers are:

Effect of power supply characteristics on d-c welding, by Jack B. Keyte, Dept. of Welding Engineering, Ohio State University.

Welding characteristics of submerged arc with three-phase power, by E. A. Clapp, Union Carbide and Carbon Research Labs., Inc., and Norman G. Schreiner, Linde Air Products Co.

Tools for predetermining preheat and interpass temperatures for submerged-arc welds, by Clarence E. Jackson and Arthur F. Shrubsall, Union Carbide and Carbon Research Labs., Inc.

Tuesday Afternoon

Hard-facing and flame-hardening are grouped into one session, to be given on Tuesday afternoon. The same period will also see the third session on resistance welding and the second ship structure session.

E. V. David, Air Reduction Sales Co., is chairman of the hard-facing and flame-hardening session. L. W. Boelter, Climax Mfg. Co., is co-chairman. Papers are:

Control of rail-end hardening, by La Motte Grover, Air Reduction Sales Co.

Hard-facing for impact, by Howard S. Avery, American Brake Shoe Co.

Development of fused metallized coatings, by Harrison S. Sayre, U. S.

(Continued on page 74)

1—DIGGING UP old Lebec-Mojave 8-in. line. The pipe had lain undisturbed in the earth since the year 1913

2—AT RECONDITIONING yard, the 40-ft lengths of old pipe were straightened with hydraulic equipment

Transplanting an Old

General Petroleum's recently completed line from the San Ardo, Calif., oil field to a marine terminal at Estero Bay might be called "new" but the piping isn't.

BY CLIFF BRONSON

San Ardo is a small California town in the Salinas River valley, about midway between San Francisco and Los Angeles. It became important nationally when oil was discovered there—a lot of oil! The San Ardo field reserves are estimated to be between 50,000,000 and 100,000,000 barrels.

Unfortunately for marketing, the San Ardo oil is of extremely high viscosity. The crude is so thick, in fact, that the cost of transportation priced it out of the market even at a time when oil was badly needed. It just couldn't be pumped through a pipe line in the original form.

Engineers of the General Petroleum Corp. studied the problem and came up with a satisfactory three-step solution. The first step was to run a pipe line over the Santa Lucia Mountains to the Pacific Ocean. The right-of-way from San Ardo to Estero Bay was over a difficult and precipitous course but presented no obstacles that could not be overcome.

Second step was to thin the crude by the addition of cutter stock. To get the cutter stock to San Ardo, a 4-in. pipe line would be laid in the same trench with the main line from San Ardo to Estero Bay. The cutter stock would be brought into Estero Bay by tankers and piped through the cutter line north to the oil fields, where it was to be mixed in specified proportions with the heavy crude.

Step No. 3 in the marketing program called for the diluted product to be heated to approximately 180 F, at which temperature it could be pumped to the out loading station under a pressure of approximately 900 psi.

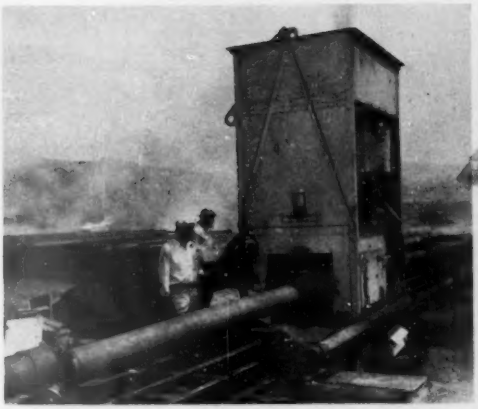
A Bigger Problem

After all of this had been worked out, General Petroleum engineers were confronted with an even bigger problem—the pipe shortage. They just couldn't get the pipe that was needed to build the 40-mile line. Ironically, there was an old line of approximately the same length and the right 8-inch diameter that had been abandoned three years ago. If only it was in the right location! But it wasn't; it was 200 miles away in the desert, running from Mojave to Lebec. Was there any hope whatever that it could be moved?

On a wishful-thinking expedition, a party of engineers dug up parts of the old pipe line, which had been laid in 1913. Since that was long before the days of welded pipe lines, the oldtimer was a threaded and coupled line of 20-ft pipe lengths. It had been built originally to supply the Sante Fe railroad with a heavy fuel oil, but became obsolete in 1948 when the railroad switched to Diesel fuel. After 35 years of service, the old line was abandoned and had been all but forgotten when the engineering party turned to it in their desperate search for a way to overcome the pipe shortage.

Normally, a pipe line that has been buried in the ground for 38 years affords little in the way of salvageable material. This line had been buried in the Mojave desert and Antelope valley, however, where an extremely dry climate had greatly minimized the usual ravages of corrosion. The sample of the line that was uncovered was found to be in good condition.

In this era of pipe shortages, controls and bureaucratic red tape, it is a great deal easier to dig up 40 miles of buried piping and move it 200 miles than it is to get the green light from Washington on the purchase of



3—CLEANING in an automatic shotblasting machine made the old pipe look new. Note the coupling at left

4—FLAME-CUTTING an end to remove the threaded portion. The 40-ft pipe lengths were reduced to 20 ft

Pipe Line

new piping. Consequently, General Petroleum awarded a contract to the Bechtel Corp., a San Francisco engineering and contracting firm, for the reconditioning and re-laying of the Mojave-Lebec line.

Pulling out the Pipe

First item in the program, very naturally, was to get the old pipe out of the ground. A bucket-type ditch digger removed the earth to expose the pipe. Workmen then went into reverse gear with the tractor-mounted

5—WELDING pairs of 20-ft pipes back into 40-ft sections, convenient for transportation and re-laying. The welded sections are tested to 900 psi

6—LAYING old pipe in the new line from the San Ardo oil field

7—IN SAME TRENCH goes a 4-in pipe line to carry cutter stock to San Ardo to thin the heavy crude oil there for pipe-line transportation

8—PLATES FLAME-CUT from old riveted storage tanks on Lebec-Mojave line. The tanks were cut apart so they could be transported

9—WITH RIVETS intact, plates were welded to rebuild the dismantled tanks

derricks that are commonly used for laying pipe down and hoisted the pipe from the trench (Fig. 1).

As before stated, the original pipe had been laid in 20-ft lengths with threaded couplings screwed over each end. Every other coupling was split during the removal process to allow the pipe to be handled in 40-ft lengths. These were hauled by truck to a reconditioning yard established at San Miguel, a site about midway along the new 40-mile line. As the lengths of salvaged pipe arrived at the reconditioning yard, they were stockpiled for subsequent operations to put them into a usable condition.

Reclamation started with the removal of the wrappings that had protected the pipe during the 38 years it had lain buried in the ground. The crews who did this job heated the pipe from the inside with gas-fired torches in order to melt the tar binder and burn off the old cigarette-type wrapping.

With wrappers burnt off, the pipe lengths went to straightening crews. The 40-ft sections were straightened with hydraulic press equipment (Fig. 2), and the pipe was ready for abrasive cleaning. This was done by automatic shotblasting equipment. As Fig. 3 shows, the cleaned pipe came out looking like new, despite its 38 years.

At this stage, each of the 40-ft lengths had a threaded coupling in the center. This was flame-cut off and scrapped, an operation that reduced the 40-ft length to the original two 20-ft lengths. The threaded portions at the other ends were also removed by flame-cutting. In the same operation (Fig. 4), the ends were beveled for subsequent welding.

Welded into New Sections

Two 20-ft lengths were tacked and then roll welded into new 40-ft lengths (Fig. 5) in order to provide pipe sections that would be convenient from the transportation and laying standpoints. Before being loaded for transportation, each welded 40-ft section was tested hydrostatically to a pressure of 900 psi.

When they reached the right-of-way, the pipe lengths were welded to form the new line. Upon completion of welding, the pipe was given a spiral protective wrapping as is shown in Fig. 6.

There was nothing unusual about the laying. As long a string of pipe as could be conveniently handled was roll welded on skids at the edge of the trench, laid down and then bell-hole welded into the line.

At the same time that the 8-in. line for the crude was being constructed, the 4-in. line for the cutter stock was also being laid (Fig. 7). There were no particular problems connected with this since the necessary 4-in. pipe was available. As explained previously, the 4-in. and 8-in. lines were placed in the same trench: the 8-in. line to carry crude oil from San Ardo to Estero Bay and the 4-in. line to carry cutting stock from Estero Bay to San Ardo.

Reclaim Old Storage Tanks

While the Mojave pipe line was being salvaged, the Bechtel crews were also reclaiming three steam-powered pumping stations. The reclaimed stations included facilities for heating the oil along the line and boosting up the pressure. Bechtel also reclaimed two 50,000-bbl storage tanks.

The storage tanks had also been installed in 1913, and they were riveted tanks. Because of the small-size plates that had been used in the original construction, the job of tearing the tanks apart at first appeared to be a tremendous one. Engineers directing the job simplified the task, however, by deciding that the shell should be cut up into plates about ten times bigger than the original ones, a size that could be conveniently handled. The flame-cutting, consequently, was carried on without any regard for the riveted seams (Fig. 8). When it came time to join the plates together, welding crews merely welded along the flame-cut edges to rebuild the tanks in a hurry. Many of the old riveted seams were left intact (Fig. 9).

Again, welding has been combined with ingenuity to overcome a difficult problem. Transplantation of the old line not only helped to lick the steel shortage but also provided the only means available of tapping a huge new reservoir of crude oil. Had it not been for the decision to convert the old threaded pipe line into a new welded line, vitally needed oil might have been denied to us.

U. S. Army photograph

1—AT THE KOREAN FRONT, Sergeant Louis E. Des Tasio, of Portland, Me., repairs the crawler track of a bulldozer

U. S. Army photograph

2—WELDING "DUCKBILLS" to tank treads increases the bearing surface and allows the tank to traverse muddy bogs and rice paddies

U. S. Army photograph

3—PVT. VIRGIL SMITH, Dallas, welds a .50 caliber gun mount on a medium tank

Welding at War

At home, welding helps to make planes, tanks, ships and other defense products. On the Korean front, it is indispensable to maintenance of military equipment.

WELDING, flame-cutting and allied processes are helping to make it possible for this country to rearm faster than any nation in the world. In our defense effort, welding is not only making defense products but is making the tools that will make the armaments.

Planes, tanks, ships are welded and many, many other defense products. Very few people outside of the welding industry realize the full significance of welding in the production of war materiel. Examples of welded applications in which the finished product is but rarely associated with welding are: radar equipment, electronic tubes, shell cases, ammunition, bombs, projectiles, torpedoes, land mines, machine guns, smoke bombs, oxygen tanks and so and so on. In

U. S. Army photograph

4—BATTLE DAMAGE repair: weldor puts on a patch; his buddy forces side outward with a hydraulic jack

U. S. Army photograph

5—BRIDGES can be welded, too. Here we see a bridge at Yonch'on, Korea, being repaired by Army Engineers

some cases only a little welding is involved . . . possibly only a spot weld or a spot of weld metal . . . but the welding is indispensable.

Maintenance at the Front

The usefulness of welding to the defense effort is not limited to the production of weapons of destruction. On the battle front in Korea, we find welding being used to maintain and repair military equipment. Ingenious weldors in our military forces sometimes do work that is beyond the imagination of their counterparts in civilian life. However, civilian weldors are by no means backward in applications of welding for maintenance.

Welding is being used for the salvage of equipment, civilian or military, which would otherwise be relegated to the scrap heap.

In the maintenance of military equipment on the fighting front, it makes no difference whether the equipment involved is a heavily armored tank, a road-building tractor or a pan for a field kitchen, the weldor is on the job. Let's look at some applications. In Fig. 1, a sergeant of the 8th Engineers, First Cavalry Division, is seen repairing a link on the crawler track of a bulldozer in Korea.

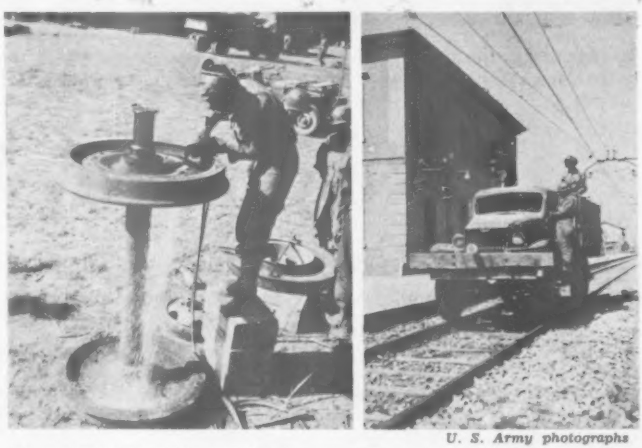
Another welding operation often seen in Korea is to weld "duckbills" to tank treads (Fig. 2). An additional 4 inches of 4-in. channel welded to the tank tread reduces the bearing pressure per square inch sufficiently to allow these armored juggernauts to travel through muddy bogs and rice paddies where they had previously stalled.

At another spot in Korea, we find a weldor from the 515th Ordnance Company, U. S. Eighth Army, welding a .50 caliber machine gun mount to the turret of a medium tank (Fig. 3). Stainless-steel electrodes greatly simplify the job of joining the cast steel mount to the cast armor turret.

Battle Damage Repaired

Welding is also used for the repair of actual battle damage. Though the welded steel hulls of our military tanks can and do take a severe beating without failure, a direct hit by a 105-mm shell at close range is a serious matter. Fortunately, the damage can be quickly repaired by welding. In Fig. 4, the two GI's from a heavy maintenance company of a tank unit are engaged in such a task. The weldor is welding a plate over the damaged area, while his buddy forces the side of the tank outward with a hydraulic jack.

Besides mobile equipment, bridges can be repaired by welding. Witness Fig. 5, where Army Engineers are



U. S. Army photographs

6—INGENIOUS ENGINEERS flame-cut train wheels to fit rims of a 2½-ton Army truck. Truck can then be used as a locomotive (right picture)

Official U. S. Navy photo

7—"MAGIC BOXES" are 1½-ton pontoons to support a pier. Navy Seabees are welding on reinforcing plates

Official U. S. Navy photo

8—J. F. BASSETT, seaman second class, does a job from a bosun's chair alongside the USS *Wilkes-Barre*

fixing up a bridge near Yonch'on, Korea.

In typical American fashion, our GI's often work hard to avoid hard work. Let's look at one of the instances where brainwork paid off.

Truck Travel on Rails

While bad weather did nothing to improve the roads of Korea, any GI can tell you that they were nothing to write home about in the first place. It was often more convenient to get around by rail. For this reason, the GI weldor in Fig. 6 is flame-cutting railroad car wheels to fit the rims of a 2½-ton truck. Afterwards, the rim will be welded to the truck wheel so as to make possible the use of the truck on the rails. In effect, the 2½-ton truck becomes a light locomotive, as pictured in the other half of Fig. 6.

The Army is not the only part of the defense forces to use welding advantageously. In Fig. 7, a group of Navy Seabees are welding reinforcing plates to a string of 1½-ton pontoons. About 30 of these "magic boxes" are being joined together to form a pier or causeway that the Navy can use to get supplies ashore.

It is not unusual to see a weldor swinging from a bosun's chair (Fig. 8) as he does a job of welding "over the side". The training of Navy weldors is such that many of them can do their welding "top side" or underwater with similar ease.

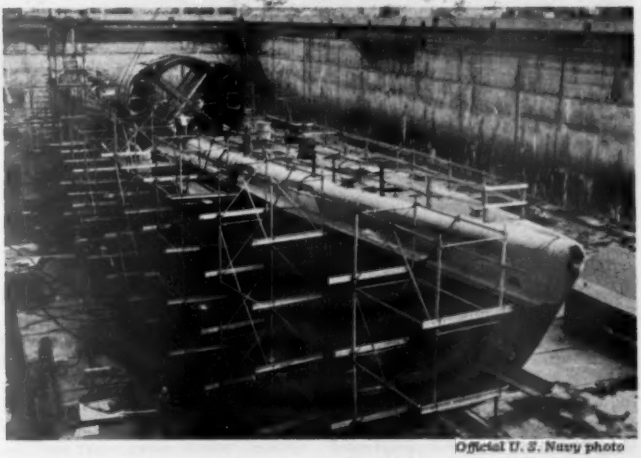
These are just a few of the uses being made of welding on the fighting front. On the home front, we can pick examples of welded jet engines, welded ships, welded tanks, trucks and other motorized vehicles.

Makes Subs Longer

Besides new military equipment, welding is sometimes used to expand the size of existing equipment. For example, two submarines are undergoing lengthening operations, similar to those so popular on tankers and ore boats*, at the Philadelphia navy yard. Welding helps add a 35-ft center section to the 311-ft USS *Redfin* (Fig. 9) and will perform a similar service for the submarine USS *Ray*.

The welded Bailey bridges that are being produced at home† have materially aided our soldiers on the Korean front, making it possible for them to place strong steel bridges across streams and other water barriers in a short time.

If you want to know the importance of welding in war, just ask any soldier from the fighting front. He will be glad to tell you the reliance he places on welded weapons.



Official U. S. Navy photo

9—ADDING a 35-ft center section to the 311-ft submarine USS *Redfin*. After being lowered in place, the new section will be welded in position

*See "Making a Ship Grow," The Welding Engineer, Sept., 1951.

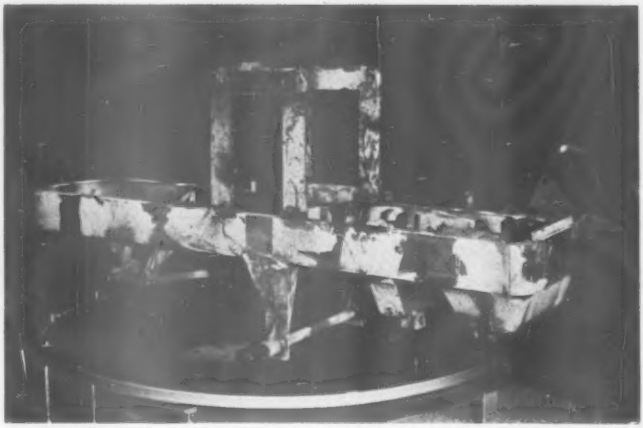
†See "CECO Builds Bailey Bridges," The Welding Engineer, May, 1951.

Clean-up Is No Longer

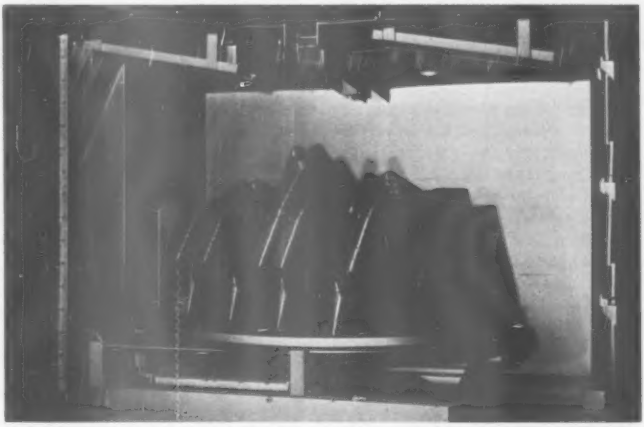
Centrifugal force does the job of cleaning big weldments at Frank G. Hough Co.

BY EUGENE F. ANDERSON

How do you clean heavy and bulky welded fabrications fast enough to keep up with high-speed production schedules? The problem has been solved at the Frank G. Hough Co., Libertyville, Ill., manufacturer of the "Payloader" line of power shovels. The Hough Co. found that by means of "airless blasting" welded assemblies can be cleaned in a matter of minutes, even when there are a lot of pockets and recesses. Furthermore, this quick cleaning method provides a more satisfactory finish for painting.



WELDED FRAME coated with spatter, flux, rust and scale about to enter blast room at Frank G. Hough Co., Libertyville, Ill. Now look on the right



84-INCH BUCKET positioned on work table for blasting. The slots in the roof and the left wall indicate locations of the abrasive-throwing wheels

Frames and Buckets

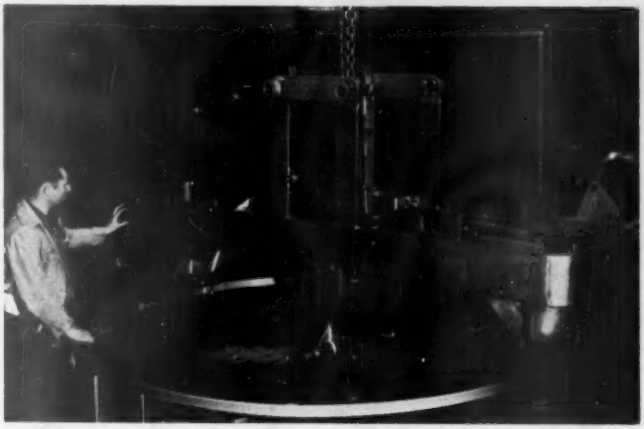
The weldments to be cleaned include 90-in.-long frames and 84-in. scoop buckets. Formerly, the flux, rust and welding spatter were removed from these assemblies by manual wire brushing, chipping and grinding. Even though seven men worked on each of two shifts doing nothing but cleaning, the cleaning room was always a bottleneck. Besides jamming up the flow of parts, hand cleaning did not produce a uniform finish. Paint did not adhere satisfactorily to the assemblies; in fact, it was not uncommon for the paint to be scuffed off before the machinery even left the factory.

Officials of the Hough plant decided that the postweld cleaning problem might be met by some form of abrasive blasting. They called in engineers from the American Wheelabrator & Equipment Corp., Mishawaka, Ind., to analyze the situation. The engineers found that the longest production piece was approximately 10 ft long and would swing in a 10-ft circle; however, three to four times a month there would be a 14-ft piece. Bearing these dimensions in mind, they designed a tailor-made car-type room that would handle automatically any piece that would swing or rotate in a 125-in. circle. The cabinet was also made long and roomy enough to accommodate the occasional 14-ft piece, though not automatically. This limitation made possible a less expensive installation.

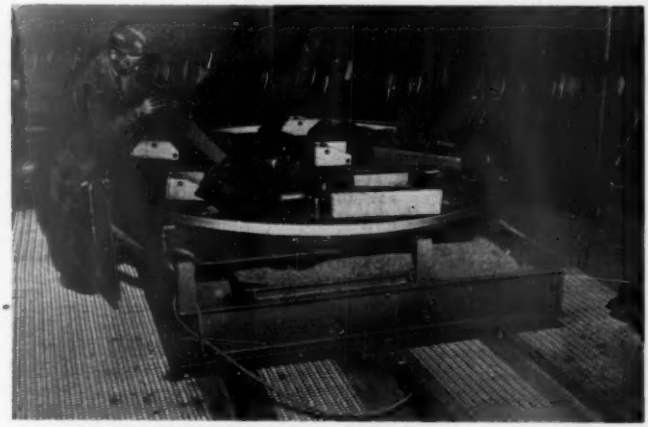
The cabinet is 18 ft long by 12 ft wide. It is equipped with two rotating wheels that hurl metallic abrasive at the work. Centrifugal force does the job without the use of compressed air. The weldments rest on a circular work table that rotates under the blast stream. This 96-in.-diameter table is mounted on a car and travels in and out of the room on a track. Work is easily loaded and unloaded when the table is outside the room.

One abrasive-throwing wheel is located at the side of the cabinet; and the other is in the roof. The car can be placed automatically in several spots throughout the length of the cabinet, which means that the two wheels can simulate the positions of several wheels. The exact number of

a Bottleneck



SAME FRAME for power shovel after five minutes of blasting. The blast chamber saves the labor of eight men and produces a uniform matte finish



MISCELLANEOUS welded assemblies after blast cleaning. The 8-ft work table rotates the weldments under the abrasive streams of the two wheels

wheels simulated would, of course, be twice the number of positions at which the car can be automatically placed. The work table can be rotated at any of the positions, with the result that there is no recessed portion of a welded assembly that cannot be reached by the abrasive blast. The entire area of the 8-ft table can be adequately covered.

Though compressed air plays no part in the main blasting operation, the cabinet is fitted with a supplemental air-blast nozzle for touch-up work, primarily on the 14-ft piece. Since the table cannot rotate with a 14-ft beam on it, some touch-up work by compressed air is required.

Look at the Figures

After the installation of this blast cabinet, labor requirements for finishing dropped from 112 to 64 man-hours daily. Instead of 14 men (seven on each of two shifts), only six men are required: four to do chipping, grinding and wire brushing, two to operate the cabinet. The reason for this labor saving is quite apparent from a comparison of the individual cleaning times required by the frames and scoops. Let us look at the figures.

The 90-in. frame of the "Payloader" is now blast cleaned in from 5 to 15 minutes; this same job by former manual methods took 2½ hours.

On the 84-in. scoop bucket, a reduction of 2½ hours in cleaning time has been effected. Instead of manual cleaning methods that took three to four hours, the bucket is now centrifugally blasted for six minutes (three minutes on each side). Some hand chipping and grinding is needed because of very heavy welding spatter plus touch-up, but the time has been reduced to an average of 30 minutes per piece.

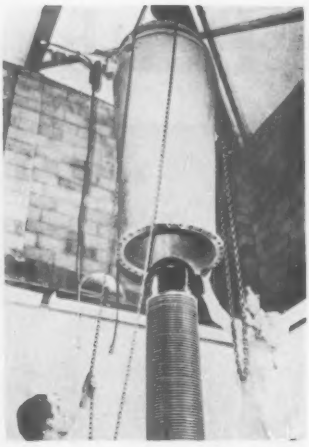
The 14-ft piece formerly required about two hours to be cleaned manually. It is now cleaned with four minutes of airless blasting and 15 to 20 minutes of touch-up by air-blasting. This piece, remember, is the one that cannot be handled automatically.

Paint Clings Tenaciously

Besides the savings of thousands of man-hours a year in labor, other important improvements have been brought about by airless blasting. A fine matte finish is obtained on the weldments, to which paint clings tenaciously, even under severe use out in the field. The finish is always uniform. As another advantage, the air around the entire cleaning room is dust free because the cabinet is completely closed when the wheels are running, and no abrasive or dust can escape from it. There is less danger of eye accidents—no danger at all during automatic cleaning because the operator is not inside the cabinet. This special cabinet comes in very handy for miscellaneous cleaning of parts purchased from outside suppliers. Surface blemishes such as rust, sand and scale must be removed before such parts can be put into assembly; the cleaning cabinet does the job in practically no time at all.

Though demand for the company's products has increased tremendously since the airless blast room was installed, the cabinet has been able to keep up with production. Postweld cleaning is no longer a bottleneck.

TRACER TECHNIQUE: radioactive elements incorporated in filler rods produce a radiation that may be utilized for non-destructive inspection



"STATITRON" is a super X-ray tube related to the atom smashers

New Methods for

Engineers are working overtime to develop new ways of non-destructive testing. This excellent article gives you the chance to bring your knowledge up-to-date.

BY THOMAS A. DICKINSON

THERE is no lack of equipment or methods available for the non-destructive inspection of welded structures. Some of these methods are comparatively old and have proved themselves in years of service; others are almost untried outside of the laboratory.

It is the intent of this article to discuss all of the non-destructive test methods, the old as well as the new, so that the reader may evaluate them for himself. Bear in mind, please, that there is as yet no panacea that can be guaranteed 100% to solve each and every problem connected with the inspection of welds.

It might be a good idea to start out by explaining what is meant by non-destructive testing. It can always be distinguished from destructive testing, such as tensile testing or metallographic examination, by the fact that no samples or coupons are required. Visual examination is, of course, a form of non-destructive testing, but it is not usually considered to belong in this category. The non-destructive test methods are able to locate flaws that are normally imperceptible to the eye, even when aided by a powerful magnifier. The fact that hidden defects may be uncovered without damage to the work being inspected can be of vast advantage in welded fabrication and production.

X-Rays to Ultrasonics

Five non-destructive test methods should be well known to the readers of this publication since they have all been mentioned frequently by trade publications including THE WELDING ENGINEER. These are: X-ray, radium, magnetic-particle, fluorescent and ultrasonic inspection. Since these five methods have been so thoroughly covered in welding literature, we will give no more than a brief description of each.

(1) X-radiography. X-rays produced by a high-voltage source are passed through the work inspected and fall upon a photographic film, which is then chemically developed so that the presence or absence of flaws can be visually ascertained. This has been and still is one of the most effective non-destructive testing techniques, but the requisite equipment is rather expensive. The X-ray machines employed range in potential from 100 to 2,000 kvp (100,000 to 2,000,000 volts), the most popular sizes probably being in the range from 250 to 400 kvp. The very large 1,000,000-volt and 2,000,000-volt machines produce extremely "hard" X-rays that merge into the wavelengths of gamma radiation. X-rays are reflected by certain types of materials (such as lead and brass alloys) and cannot ordinarily be used to penetrate any substance with a thickness greater than 5 in. The 1,000,000-volt X-ray tube has a practical limit of around 8 in. of steel, the 2,000,000-volt X-ray is even more penetrating, but such giants of radiography are beyond the price range of most fabricators.

(2) Gamma-ray inspection with radium. The idea of using gamma rays for the inspection of welds and castings originated with Dr. Robert Mehl, superintendent of the Division of Physical Metallurgy, U. S. Naval Research Laboratory, as long ago as 1928. Radium sulphate is the generaly employed gamma-ray source. The radium salt, in a quantity of around

DYE-PENETRANT inspection uses a red dye of extraordinary penetration to reveal surface flaws. Hairline cracks are shown up as bright-red lines

ULTRASONIC detection equipment in use at the Douglas Aircraft Co.

Non-Destructive Inspection

25 to 100 milligrams, is sealed in an airtight silver capsule that is carried to the job in a lead-lined case. Films of the X-ray type are used, and the technique of detecting flaws is similar to X-ray technique. Gamma rays from radium are shorter or "harder" than the X-rays ordinarily employed for radiography and are thus able to penetrate a greater thickness (up to 11 and 12 in. of steel). With the radium capsule, however, a considerably longer time is required for the exposure.

(3) Magnetic-particle inspection. This method involves the magnetization of ferrous materials so that magnetic powders clinging to the surface will denote the presence or absence of such flaws as cracks, laps, seams and inclusions. Some subsurface defects can be detected, but the magnetic-particle method does not compare with radiography—X-rays or gamma rays—in this respect.

Its chief advantage is speed since the defect can be spotted immediately —without waiting for a photographic film to be developed. Magnetic-particle inspection can be used only for the inspection of materials that can be readily magnetized, which limits its use to ferrous materials.

(4) Fluorescent penetration. The piece to be inspected is soaked in a fluorescent liquid, subsequently washed or wiped away from all surfaces. Discontinuities in a surface allow the liquid to penetrate. When the work is inspected under ultraviolet radiation or "black light," the small quantity of fluorescent liquid that remains in a flaw causes it to stand out vividly. The required equipment is not highly expensive, and the method can be used to locate imperceptible defects in virtually all materials. The one indispensable requirement is that the defect must extend to the surface.

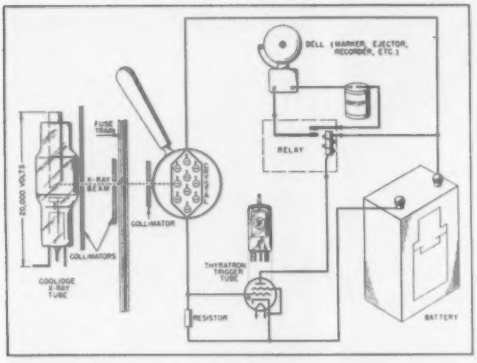
(5) Ultrasonic inspection. High-frequency or inaudible sound waves are propagated through the inspection material and reflected by a non-resonant medium on the other side or within the material. The reflected energy impulses are amplified and used to actuate a cathode tube, which visually indicates the presence or absence of flaws. Due to the resonance phenomena which characterize all materials, ultrasonic inspection equipment can theoretically be used to locate flaws in any substance. However, the equipment (as now available) is rather expensive and adaptable principally to the inspection of alloys with relatively fine grain structures. Efficiency is often proportional to the fineness of the granular structure of a metallic material.

Radioactive Isotopes

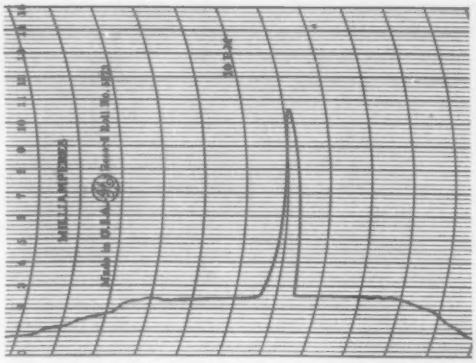
We come now to the new methods. Probably the most promising new development for non-destructive inspection is the use of radioactive isotopes. The Industrial Radiography Laboratory, Beaumont, Texas, has developed a technique for using radioactive cobalt as a source of gamma radiations.

The cobalt isotope—cobalt-60—is inexpensively available through the U. S. Atomic Energy Commission at Oak Ridge, Tenn. Its radiations might be described as X-rays with superior penetration qualities since they will pass through as many as 15 in. of solid steel (which would dissipate the output of a million-volt X-ray machine).

A most interesting variation of the radiocobalt inspection technique is now being experimentally developed. This consists of preparing weld rods containing small quantities of radioisotopes (such as radiocopper, radioiron, radionickel, radiotin, radiozinc, etc.). Welds made with such rods will produce radiations that may be utilized for non-destructive test purposes. This is known as "tracer" technique. It is said to be usable without special precautions because the minute quantities of radioisotopes in a filler rod



SCHEMATIC drawing of extremely sensitive system developed by G-E X-ray Corp. for production inspection



AUTOMATICALLY RECORDED inspection data obtained from the production-line X-ray system detailed at left

can be selected to be both weak and subject to rapid dissipation after the rod is fused.

Painting the Flaws

In principle, probably the most unusual non-destructive test process is the "Stresscoat" technique, developed by Falk Corp., Milwaukee, Wis. It consists of coating an inspection area with an extremely brittle material that resembles paint. Flaws in a weld or mated surface can be located in accordance with the tendencies of the coating to crack (as the result of metallic deformation) whenever a part or assembly is subjected to a predetermined work load.

An inexpensive substitute for the fluorescent-penetration process is the dye-penetrant technique recently evolved for detection of minute surface flaws by engineering personnel of Northrop Aircraft, Inc., Hawthorne, Calif. A non-toxic, non-corrosive dye solution of extraordinary penetrating quality is brushed on the inspection surface. The dye is removed with a special surface cleaner after a five-minute soaking interval. Defects appear as bright-red lines or dots when the dye residue beneath the inspection surface is developed with a third chemical solution. The flaws thus disclosed to the naked eye are said to be undetectable if examined in other circumstances by means of a magnifying glass.

What might be described as a combination of magnetic and ultrasonic test methods is the process recently developed by Magnetic Analysis Corp. A conveyor-type instrument is used to pass metallic materials through a strong metallic field so as to actuate an oscillograph. Flaws are visually indicated in accordance with the physical and chemical changes in the materials as they are passed through the field at speeds up to 150 feet per minute.

Xerographic Radiography

To conserve photosensitive materials, where inspections are made with X-rays or the aforementioned radioistopic elements, Haloid Company of Rochester, N. Y., has developed xerographic plates that can be repeatedly sensitized with static electricity. Images produced by exposure of the plates are developed with special powders instead of by the usual photo-processing solutions. The powder images can then be transferred to non-sensitive surfaces so that the xerographic plates can be recharged and reused indefinitely.

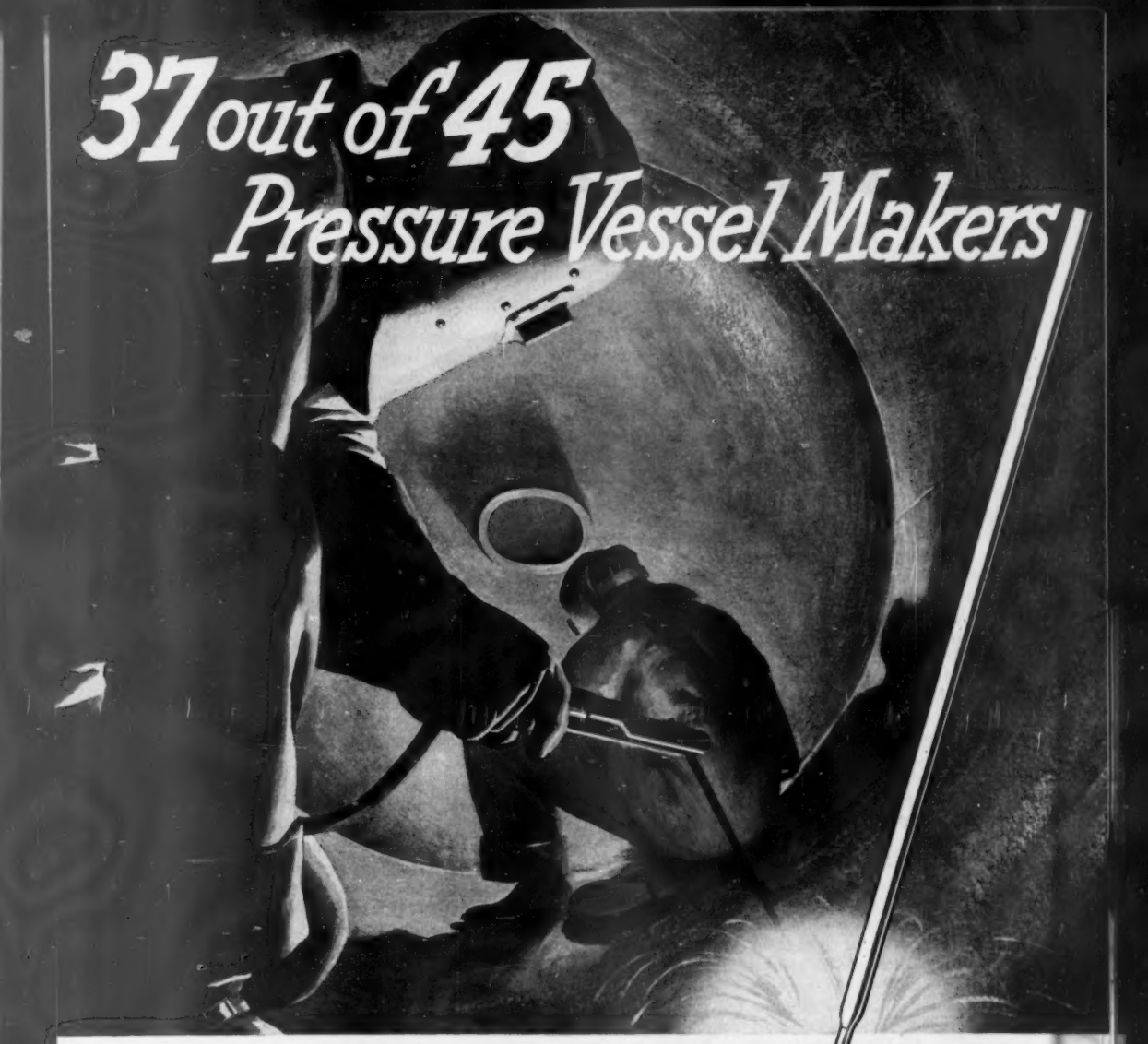
Westinghouse Electric Corporation has successfully produced an electronic fluoroscope, said to have the advantage of locating tiny internal defects whose presence could not otherwise be detected. It combines an X-ray tube, a fluorescent screen and a special lens system in order to produce an image of unprecedented brightness on a second fluorescent surface.

A television pick-up system, recently developed by Radio Corporation of America, reportedly exceeds the performance of the Westinghouse fluoroscope by magnifying inspection images as many as 1,000 to 10,000 times. At this writing, however, the RCA system appears to be too expensive for most industrial applications.

The Sperry Products plant at Danbury, Conn., is now testing a new-type acoustical inspection instrument invented in Germany. This instrument projects sound waves through an inspection material in the same way X-rays are projected. Engineers believe this will eliminate some of the difficulties that have been encountered in obtaining inspection data from amplified sonic reflections.

Engineers for North American Aviation, Inc., at Downey, Calif., have developed what might be described as a "super X-ray machine". It is known as the "Statitron," and is related in principle to atom-smashers such as the cyclotron. However, it was designed to displace—not to split—atoms. Among other accomplishments, it is said to be able to penetrate more than two solid feet of steel.

Probably the most sensitive system for production inspection work with X-rays was recently developed by General Electric X-Ray Corp., Milwaukee. It involves the use of a synthetic "slave" crystal to amplify as many as a million times radiations projected through inspection materials. This device is adaptable to conveyorized (fully automatic) production operations because it is equipped to record all essential inspection data without human assistance. Intermittently producing a warning signal for the benefit of operating personnel if objectionable defects are encountered, this mechanical inspector is said to be capable of scanning as many as 600 units per minute.



Thirty-seven out of the nation's forty-five foremost makers of pressure vessels are long-time users of Murex Electrodes.*

In this industry, welding electrodes must provide high quality weld metal to meet rigid code requirements — must have high deposition rates to assure economy of production. These are two characteristics for which Murex electrodes are noted.

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33rd Metal Show

Here's a foretaste of what awaits you at Detroit. The Metal Show is being held concurrently with the first World Metallurgical Congress. The show theme is "Production for Defense."

BY WALTER MORRISON

THIS YEAR'S Metal Show will have all the stops out. It's going to be mighty, and you'll probably like both the size and significance of what will happen.

Close to 400 nationally known firms engaged in the production of metals, the treatment of metals, metal fabrication or in service businesses connected therewith, will exhibit at the Michigan State Fair Grounds, near Detroit, from Monday Oct. 15 through Friday Oct. 19. There will be 286,886 sq ft of floor space—6½ acres. In addition, thousands of square feet of floor space will be utilized for special meetings, forums, lectures and other activities of the National Metal Congress, the National Metal Exposition and the World Metallurgical Congress.

How to Get There

The Michigan State Fair Grounds will be made convenient to visitors —whether they drive or come in by plane or train. There will be express bus service at 20-minute intervals from the downtown hotels direct to the Fair Grounds. Running time from downtown to the Fair Grounds will be 20 to 25 minutes. This bus service will be under the management of the Metal Show and will be set up for the exclusive use of Show visitors. Loading will be at each of the five headquarter hotels: Book-Cadillac (American Welding Society), Statler (American Society for Metals), Detroit-Leland (Institute of Metals Div., American Institute of Mining and Metallurgical Engineers); Hotel Detroiter (Society for Non-Destructive Testing) and the Hotel Tuller (World Metallurgical Congress).

If you are driving your own car, you will find ample parking space available at the Fair Grounds, where there is capacity for 9,000 cars. Many restaurants are also operated within the Fair Grounds area.

Present indications are that better than 40,000 technical men will be registered for the big seven-day event in Detroit. The welding industry has been assigned an important role. Seventy-odd technical papers will be presented by some of the top experts in this field (see article, "Convention Preview," page 45, this issue). At the Metal Show itself, scores of exhibit booths will demonstrate advanced techniques in welding, flame-cutting, flame-hardening and related processes vital to both civilian and defense production.

When to Go

Sparking the big event itself will be the Saturday and Sunday seminar on "Metal Interfaces" sponsored by the American Society for Metals. On Monday noon, the Michigan State Fair Grounds will be the scene of what is prophesied to be the biggest concentration of industrial strength ever assembled at one time.

Exposition hours will be from noon until 10:30 p.m. on Monday, Tuesday and Wednesday; 10 a.m. until 6 p.m. on Thursday and Friday.

Technical meetings of the four sponsoring societies will be indicated in printed programs distributed during the five-day congress. The American Welding Society and the American Society for Metals will hold morning, afternoon and evening sessions throughout the week. The Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers will hold daily and evening sessions Monday through Wednesday. The Society for Non-Destructive Testing will hold sessions in the morning and afternoon on Monday, Tuesday, Wednesday and Thursday.

Headquarters for the four sponsoring societies will be at the Hotel Statler, Book-Cadillac Hotel, Detroit-Leland Hotel and Hotel Detroiter, as mentioned previously. The World Metallurgical Congress meets at the Hotel Tuller.

Society technical sessions will be at headquarters hotels except for the papers scheduled by the American Society for Metals and by the World Congress on Thursday and Friday afternoons. These will be given at the State Fair Grounds.

World Metallurgical Congress

Held simultaneously with the 33rd annual Metal Show and sponsored by the American Society for Metals will be the world's first World Metallurgical Congress. Over 400 leading technical experts from other nations will visit Detroit as guests of the National Congress and Exposition and will contribute their ideas in the form of special lectures, papers and forum appearances.

Defense Mobilizer Charles E. Wilson has accepted the invitation extended to him to be the major speaker at the closing session on Friday. The Wilson meeting will be staged in the Statler Hotel at 6 p.m. About 800 persons are expected to attend this final dinner meeting.

Before converging on Detroit, the foreign "conferees" will go on study tours to view biggest American industries and methods, visiting more than 60 cities in 13 states. Among the corporations and organizations who are playing host are: United States Steel, Bethlehem Steel, Timken Roller Bearing, Ford Motor, American Brass, Dow Chemical, Pratt & Whitney, Cincinnati Milling Machine, Chrysler, International Harvester, General Motors, Rennselaer Polytechnic, Westinghouse, Pullman, Nash-Kelvinator, U. S. Navy Laboratories, Great Lakes Steel, Armour

(Continued on page 72)

★ **ARCALOY** for stainless steel

★ **ARMOR-ARC** for armor welding

★ **BRONZE-ARC** for bronze and cast iron

★ **WELD-ARC** for low hydrogen electrodes

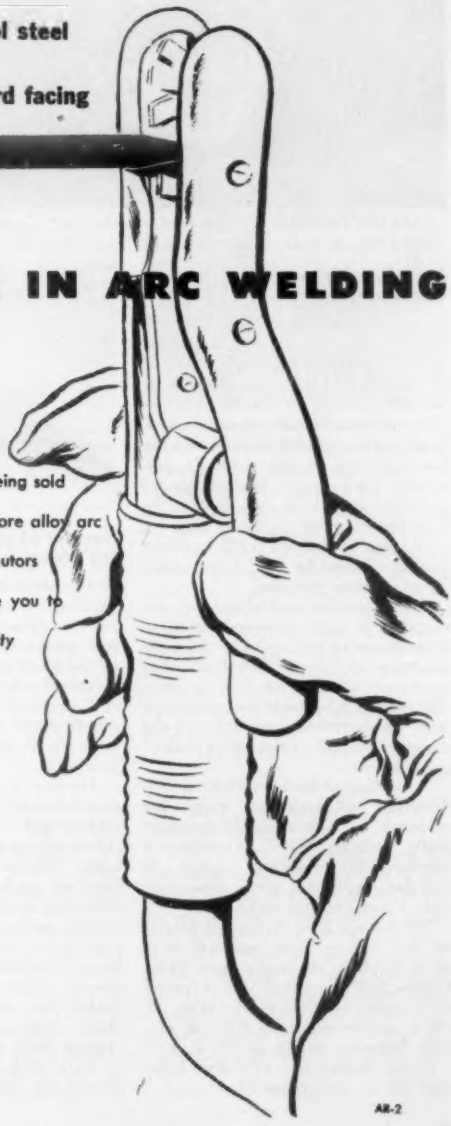
★ **NICKEL-ARC** for cast iron

★ **TOOL-ARC** for tool steel

★ **WEAR-ARC** for hard facing

★

NAMES TO REMEMBER IN ARC WELDING



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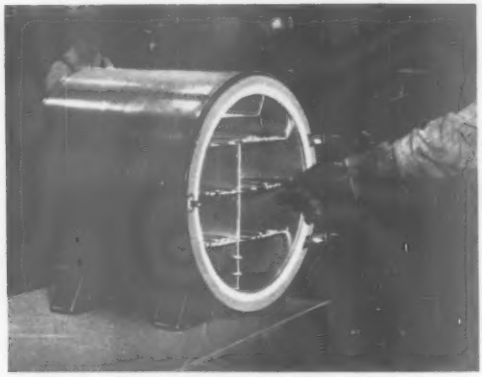
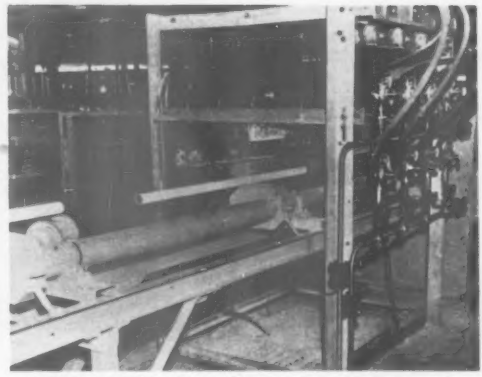


KEEPING DRY your low-hydrogen type electrodes is easy with a "DryRod" electrode oven beside the welding station



AUTOMATIC METALLIZING machine coats a 2-in. pipe with pure aluminum at rapid rate of 1,200 ft per hour

New Oven Keeps Electrodes Dry

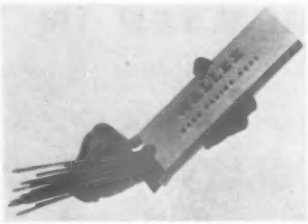
FROM THE time that manufacturer's sealed containers are unpackaged until the electrodes are actually used for welding, there is an opportunity for the coatings to absorb moisture. This can cause X-ray porosity, underbead cracking, rough welds, rod scrap loss and add rework costs. In particular, low-hydrogen coatings absorb moisture at a high rate during the first few hours of exposure after unpackaging so that the 0.2% moisture content allowed by U. S. Government Specs. is soon exceeded.

Full protection against moisture absorption is now promised users of mineral-coated electrodes by the manufacturer of the new "DryRod" electrode oven (illustration above at left). The oven is a portable heated storage unit, which provides control over the moisture content of electrodes at their point of use.

According to the manufacturer, the "DryRod" will accurately control the moisture to within 0.2%, the normally accepted U. S. Government standard for moisture content. A variable thermostat gives close control on temperatures up to 600 F.

The oven is 22 in. in outside diameter by 25½ in. long and will hold up to 350 lb of electrodes up to 18-in. lengths. Fully insulated oven is heated by an 840-watt element operating off either a 110-volt or a 220-volt circuit. Shipping weight is 112 lb.

PHILIP RODEN CO., 1721 East Lake Bluff Blvd., Milwaukee 11.



Gas Hard-Facing Rod for Abrasion Resistance

A NEW oxyacetylene hard-facing rod, "Wallex," is said to produce a deposit that combines abrasion resistance with good impact resistance and good corrosion resistance. Hardness of the deposited metal is 57-61 Rockwell C, and the melting point is approximately 2,375 F. The rod is available in 3/16, ¼ and 5/16 in. diameters, in lengths of 8 to 12 in.

Alloying elements are chromium, molybdenum, manganese, silicon, carbon and iron. Because of its excellent abrasion resistance and weldability, "Wallex" is said to be suitable for such applications as: paper machine hog anvils, potato diggers, root cutters, subsoilers, conveyor parts, coal screw conveyors, pipe-line elbows, clay feeder shoes, coke ash plows, cement chutes, clam shell bucket lips, clinker mill plates, drag chain idlers, grinder rings, coal crusher teeth, rolling mill guides.

WALL COLMONOY CORP., 19345 John R St., Detroit 3.

British Metallizing Unit Brought to United States

FULLY AUTOMATIC metallizing equipment designed and built for specific production applications by Metallisation, Limited, of Dudley, England, is now available in this country. The accompanying picture (right, above) shows a section of one of several automatic units in daily use in Great Britain. In this picture, a 2-in. scaffold pipe is being blasted and metallized with pure aluminum 0.004 in. thick at a speed of 1,200 lineal feet per hour. Though this machine is more than 40 ft long, it is so controlled that only two men are needed to operate it. The low cost of operation resulted, in this instance, in a total cost (labor, material and overhead) of less than 10c per sq ft for both blasting and metallizing.

The equipment can be used to apply all ferrous and non-ferrous metals that are produced in wire form. Materials that may be coated include all metals, glass, wood, paper, ceramics, carbon and many plastics.

DIX ENGINEERING CO., INC., 1415-17 Dix Road, Lincoln Park (Detroit) 25, Mich.

* * *

Simple Masks Give Inexpensive Dust Protection

NUISANCE dusts are kept away from workers' lungs with the G-S No. 33 dust mask. Made of a special vegetable fibre, these masks are washable and sturdy enough for continuous

for welding

use, though inexpensive enough to be discarded. Masks are finished with an elastic headband.

GENERAL SCIENTIFIC EQUIPMENT Co., 2700 W. Huntingdon St., Philadelphia, 32.

* * *

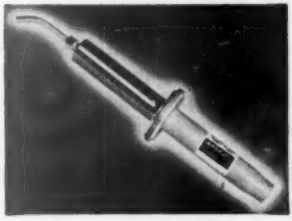
New Hand Cream Helps Dirt to Rinse Off

BY RUBBING a portion of "Craftsmen Hand Cream" into his hands before welding, a weldor assures himself of an easy clean-up. All grease, oil, paint, lacquer, etc., just rinse off when he puts his hands in water, says the manufacturer. No gritty soaps or harsh solvents are required.

"Craftsmen Hand Cream" comes in 8-oz. jars, 1 and 5 gal cans and in 55-gal drums.

OTTAWA ENGINEERING AND SALES Co., 14164 Ironwood Drive, Marne, Michigan.

* * *

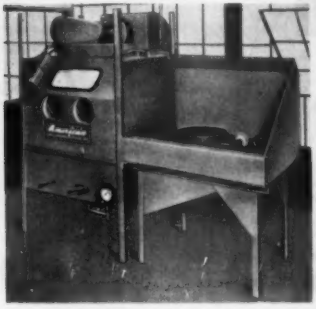


New Guns for Welding Thermoplastic Containers

PIPE LINES, tank liners and chemical containers made of thermoplastic material may be fabricated with two new welding guns. One is gas-heated and the other electrically heated. Both operate on the same principle— a stream of compressed air or inert gas (such as nitrogen) is passed at low pressure through the heating element and then through a nozzle on the end of the gun. Temperatures of this stream, which melts and welds the plastic edges, can be varied between 300 and 700 F. Operating instructions come with each welding gun.

AMERICAN AGILE CORP., Plastics Div., 5806 Hough Ave., Cleveland 3.

* * *



New Wet Blast Machine Designed for Metalworking

"LIQUAMATTE" is a new wet blast machine with many special features that will be shown for the first time at the October Metal Show. It is intended to perform work for which dry blasting is too severe; namely, work with thin edges and sharp corners or work needing precision cleaning. A reset timer is available to tell at a glance the number of blasting hours that the abrasive has been in the machine, letting the operator know when to change abrasive.

AMERICAN WHEELABRATOR & EQUIPMENT CORP., Mishawaka, Ind.

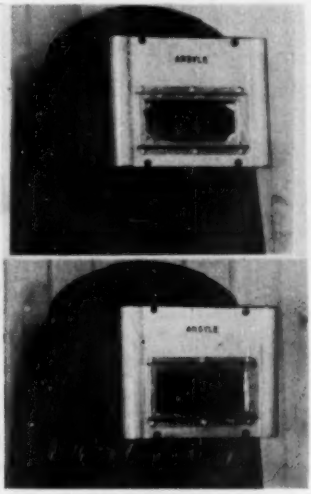
* * *

Non-Corrosive Flux for Soldering Electrical Parts

ELECTRONIC PARTS may be safely soft soldered with a new non-corrosive flux, that is also said to be non-hygroscopic and non-conductive to electricity. The mild acidity of the flux is neutralized by the heat of the soldering operation. This No. 30 flux is not recommended as a general substitute for the commonly used zinc chloride fluxes but for applications where rosin-base fluxes are unsatisfactory. It is claimed to be as "active" and as powerful as zinc chloride fluxes.

SUPERIOR FLUX & MFG. Co., 1302 Ontario St., Cleveland 13.

* * *



You Blow in Mouthpiece To Lift Welding Lens

"QUIK-LIFT Window" attachment for welding helmets permits the weldor to change electrodes or position small workpieces without lifting his helmet. The device consists of an aluminum frame for holding the filter lens and cover, an air-operated lift for raising the filter lens and a tube-and-mouthpiece to be mounted inside the helmet. To raise the dark glass, the weldor blows into the mouthpiece; to lower it, he sucks in. The "Quik-Lift Window" is said to fit any standard welding helmet.

ARGYLE MFG. Co., Colchester, Ill.

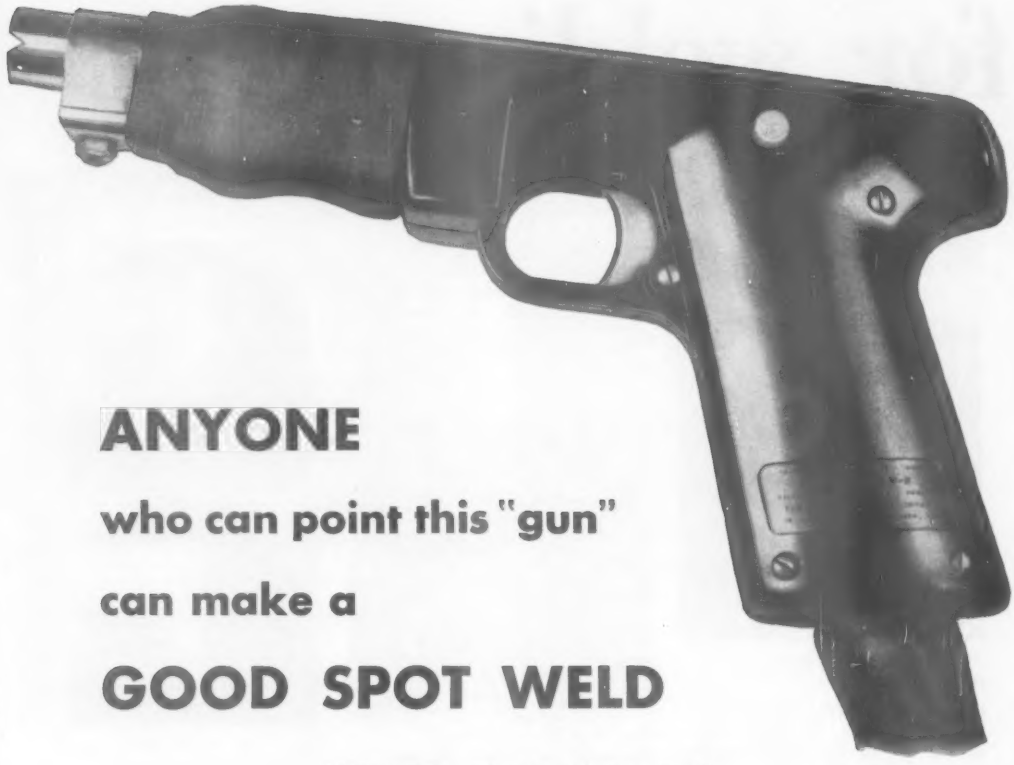
* * *

Curved Plastic Lens Resists Pitting

A NEW 6-curve plano plastic lens for industrial safety goggles has a surface hardness that resists scratches, abrasions, pitting and common industrial acids. Called "Plas-Tough," it is claimed to be the equal of heat-toughened glass in impact resistance and light transmission. These lenses come in the drop-oval shape in 44 and 47 mm sizes as well as 50 mm round.

WILLSON PRODUCTS, INC., Reading, Pa.

(More New Products on Page 108)



ANYONE

who can point this "gun"

can make a

GOOD SPOT WELD

"HELIARC" HW-8 Pistol-Grip Torch
needs no forging pressure...works from one side of sheet... spot welds both STAINLESS and CARBON STEELS

Are you using light gage metals to fabricate large assemblies or irregular shapes? If so, chances are you can simplify many of your joining problems, boost production, and cut costs, too, by spot welding with the HELIARC HW-8 Torch.

The HW-8 joins mild steel, low alloy, or stainless steel .020 to .064 in. thick at one to two seconds per weld. Because it works *from one side of the sheet*, without forging pressure, it makes an easy, one-hand job of spot welding — even in places where resistance welding is not practical or possible.

Connected to a suitable power source with auxiliary timer, the HELIARC Spot Welding Torch makes inert gas shielded welds without fumes, smoke, or spatter. Since operation is automatically controlled, workmen on the assembly line need only press the "muzzle" of the "gun" against the work and pull the trigger. A single hose assembly permits free use of the torch over a 25-ft. radius.

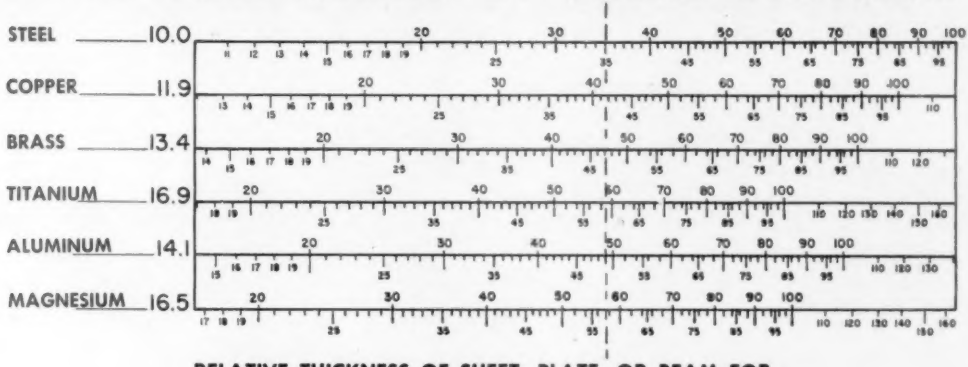
For further information, telephone or write today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

The term "Heliarc" is a registered trade-mark of Union Carbide and Carbon Corporation.

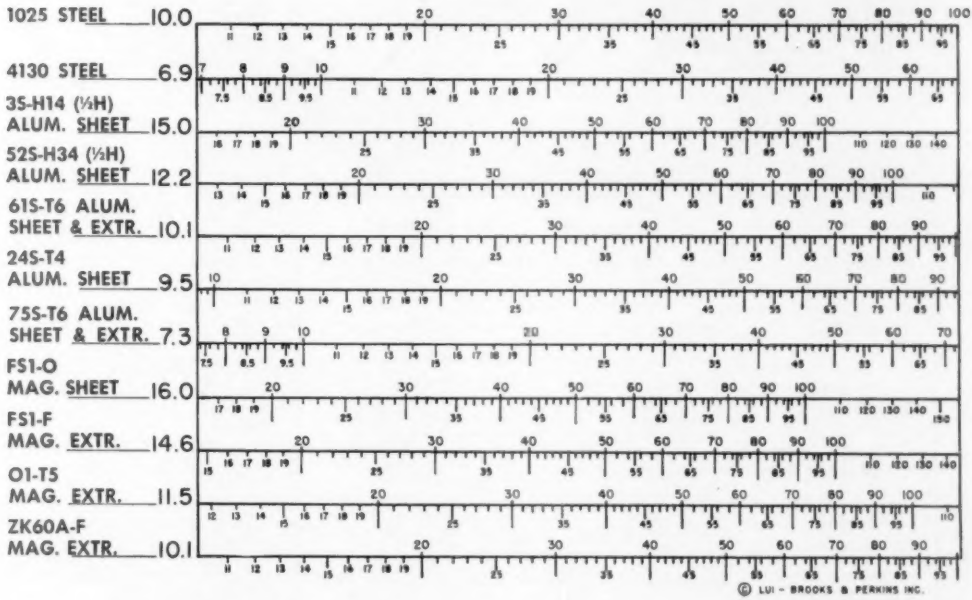
Linde Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, and FORMING METALS

RELATIVE THICKNESS OF SHEET, PLATE, OR BEAM FOR
STRUCTURAL METALS OF EQUAL STIFFNESS



RELATIVE THICKNESS OF SHEET, PLATE, OR BEAM FOR
STRUCTURAL METALS OF EQUAL STRENGTH
IN BENDING—BASED ON AVERAGE OF TENSILE AND COMPRESSIVE YIELD STRESSES


1025 STEEL 10.0
4130 STEEL 6.9
3S-H14 (½H) ALUM. SHEET 15.0
52S-H34 (½H) ALUM. SHEET 12.2
61S-T6 ALUM. SHEET & EXTR. 10.1
24S-T4 ALUM. SHEET 9.5
75S-T6 ALUM. SHEET & EXTR. 7.3
FS1-O MAG. SHEET 16.0
FS1-F MAG. EXTR. 14.6
O1-T5 MAG. EXTR. 11.5
ZK60A-F MAG. EXTR. 10.1
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THIS series of logarithmic (slide rule) scales are so arranged as to provide a means for finding the relative sheet, plate or beam thickness required for various metals of equal stiffness or equal strength.

Corresponding values for different materials may be read vertically in line within each of the two sections. The dotted line shows how (top section).

The theoretical relationships shown have to be interpreted with the proper decimal point. For example, 0.049-in. aluminum sheet has the same stiffness as 0.035-in. steel or 0.058-in. magnesium.

Similarly, from the same reading, an aluminum beam of 4.9-in. depth corresponds in stiffness to 3.5-in. steel and 5.8-in. magnesium.

Courtesy "The Magazine of Magnesium"

REBUILD YOUR WORN EQUIPMENT with
VICTOR HARD-FACING ALLOYS

	FOR THESE CONDITIONS	FOR SUCH EQUIPMENT
VICTORALLOY	Abrasion and severe impact	Tractor rollers, dredge pump impellers, bucket lips and teeth, rock crushers, steel mill wobblers
VICTORTUBE	Severe abrasion	Scarifier teeth, dredge cutter blades, posthole augers, oil field tools, ditcher teeth
VICTORITE	Earth abrasion or sliding friction	Plowshares, cultivators, steel mill guides, cement chutes, shaft bearings, rolling mill guides
VICTOR HS 1	Corrosion, heat and abrasion	Saw-teeth, carbon scrapers, wire guides, rocker arms
VICTOR HS 6	Red heat, impact, corrosion and abrasion	Blanking, forming and trimming dies; cams, hot punches, pump shafts
VICTOR TUNGSMOOTH	Thin cutting edges	Coal cutter bits, brick augers, pug-mill knives, screw conveyors

Made for both acetylene and electric AC and DC application. Get your supply from your VICTOR dealer NOW.

VICTOR
WELDING AND CUTTING EQUIPMENT

Write today for helpful folder, showing where and how to use VICTOR hard-surfacing rods.

VICTOR EQUIPMENT COMPANY

ALLOY ROD AND METAL DIVISION

3821 Santa Fe Avenue, LOS ANGELES 11, CALIF. — 11320 S. Alameda St., LOS ANGELES, CALIF. — 844 Folsom St., SAN FRANCISCO 7, CALIF. — 1312 W. Lake St., CHICAGO 7, ILL.

For Your Technical Library—
Free Catalogs • Booklets • Bulletins

A Welding Engineer Reader Service

1 WELDING CABLE CONNECTOR—Albert & J. M. Anderson Mfg. Co., Boston 10, Mass. 8-page catalog 49B tells about the "Eitherend" welding cable connector. Complete dimensional, operating and general rating information is furnished.

2 WELDOR'S HAND CREAM—Ottawa Engineering and Sales Co., Marne, Mich. Literature tells how "Craftsman Hand Cream," when applied to the skin before welding or handling grimy objects, protects the skin and rinses off all dirt in plain water. See page 68.

3 HYDRAULIC MAINTENANCE—Logansport Machine Co., Inc., Logansport, Ind. Pocket-size booklet, "The Facts of Life on Air and Hydraulic Devices", tells the "don'ts", and "what to look for's" in setting up and servicing air and hydraulic lines and equipment.

4 REVERSIBLE GLOVES — Washington Glove Corp., Milwaukee 2. Single-sheet, two-color leaflet describes styles of new plastic gloves that may be reversed and worn on either hand. See page 111.

5 SPOT WELDING NICKEL ALLOYS—The International Nickel Co., Technical Service Section, New York City 5. Comprehensive 32-page bulletin T-33 gives excellent summaries of spot, projection, seam and flash welding of nickel and nickel alloys. Photos and tables of various conditions, mechanical properties and compositions are included.

6 PREWELD CLEANING OF ALUMINUM — Oakite Products, Inc., New York City 6. 18-page booklet gives thorough discussion of chemically cleaning aluminum for spot welding. It tells how to clean, deoxidize, rinse and dry aluminum in detailed notes, tables, graphs, and illustrations.

7 BRONZE ELECTRODES — Ampco Metal, Inc., Milwaukee 46. 8-page reprint of an article, "Jobs You Can Do with Bronze Electrodes," by F. E. Garriott, originally appearing in the July, 1951, issue of THE WELDING ENGINEER. A full-page table of non-ferrous electrode specifications and properties is included.

8 GRINDER GUARDS—Morrison Products, Inc., Cleveland. 4-page, 2-color bulletin pictures and describes the various guards that are now available to protect grinding operators from injury. See page 112.

9 SURFACE INSPECTION — The Brush Development Co., Instrument Div. 58, Cleveland 14. 8-page folder describes applications and equipment for "Faxfilm," a process that employs a plastic replica to show roughness, wear, grain and other surface conditions of any shape.

10 METALLIZING MAINTENANCE—Metallizing Engineering Co., Inc., Long Island City 1, N. Y. 6-page folder tells how a Pennsylvania refinery metallizes pump rods with stainless steel to save 4,000 lb. of alloy steel and 2,200 man hours in one year. Other stories include salvaging of 1,000 hp Diesel locomotive pistons.

HOW TO ORDER: Fill out one of the small card sections completely (name, address, your company, etc.) for each piece of literature you would like to have. Each card section must be completely filled out; do not use ditto marks. Each circle must contain the number that appears with the item on which you desire further information.

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Your Company Jones Mfg. Co.

Name John Smith

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Chicago, Illinois The Engineer

THE WELDING ENGINEER

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THE WELDING ENGINEER

520 NORTH MICHIGAN AVE.

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11 GRINDING KNOW-HOW—Norton Co., Worcester 6, Mass. Actual abrasives are printed on the cover of this 4-page, 4-color "catalog of catologs." It describes and lists 18 booklets and catalogs on the setting up, truing, dressing and applications of grinding wheels, cut-off wheels, grinding discs, etc. Safety aspects, the ABC's of internal grinding and other subjects are discussed.

12 WELDING CURTAIN—Safety First Supply Co., Pittsburgh 19. Bulletin describes "Ray-Foil," a flexible, protective cloth that not only protects bystanders from welding sparks but protects the weldor from high radiant heat or other heat sources. It tells results of tests shielding against 2,000 F. on one side of curtain. See page 112.

13 PNEUMATIC STANDARDS—Miller Motor Co., Chicago 18. 12-page booklet includes the Joint Industry Conference Pneumatic Standards for Industrial Equipment, glossary of terms, two pages of standard symbols and a comparison showing how this make of air cylinders meet the standards point for point.

14 ELECTRODE DRYING—Philip Roden Co., Milwaukee 11. Two-color 3¾ by 8½ in. folder gives details of new "Dry Rod" electrode oven for preserving and stabilizing the original quality of mineral-coated electrodes. See page 62.

15 STEEL TUBING DATA—The Babcock & Wilcox Tube Co., Beaver Falls, Pa. 8-page bulletin TA1559 gives analyses and tables of physical and mechanical properties plus application data for 20 popular carbon, alloy and stainless tubing steels.

16 MAGNESIUM FIRES—Ansul Chemical Co., Marinette, Wis. Single-sheet technical bulletin No. 27 explains how magnesium flares can be extinguished quickly and safely with "Met-L-X" dry powder.

17 CARTRIDGE RESPIRATORS—Willson Products, Reading, Pa. Bulletin tells about the "800" series of chemical cartridge respirators used to hold off fumes from welding zinc or other toxic materials. See page 108.

18 SPOT WELDER CATALOG—Joyal Products, Inc., Newark 3, N. J. Latest Joyal catalog covers a line of soldering and spot-welding machines and accessories. Equipment described in this 4-page, 2-color letterhead-size bulletin is available for manual, semiautomatic and completely automatic operation.

19 INDUCTION HEATING — Allis-Chalmers Mfg. Co., Milwaukee. Booklet describes a new 16-mm color sound film titled "Induction Heating—Industry's Modern Tool" made by Allis-Chalmers. Film shows induction brazing of refrigerator parts, hardening of auto components, etc.

20 ALCOA RESEARCH—Aluminum Company of America, Pittsburgh 19. 14-page illustrated booklet describes the aim and scope of the research carried on at Alcoa's East St. Louis, Ill., laboratory. Some products discussed are abrasives, ceramics, refractories, etc.

21 SAFE RECORDS—Remington Rand, Inc., New York City 10. 8-page booklet, "The Cost of Burned Records," leads off with some grim percentages on the fate of businesses whose records went up in smoke. Back page, titled "The Silver Lining," shows what can be done to assure 100% fire protection.

22 CASTERS FOR WELDERS—Clinton Products Co., Clinton, Mich. Single-sheet bulletin tells about "Geiger-Knight" castors to move weldors, work tables, stools, etc. around easier. Picture shows unique shape of castors.

23 ARC WELDING PHOTOS—Hobart Brothers Co., Troy, O. 16-page booklet of Hobart "Arc Welding News" has interesting photos and welding news from all over the country, including time- and money-saving applications.

24 NEW METAL CLEANERS—Pennsalt Chemicals, Market Research Div., Philadelphia 7. Bulletin describes four new "SC—Solubilizing Cleaners" developed to remove such complex soils as buffing compounds, greases and pigmented drawing compounds.

25 A-C WELDER—Air Reduction Sales Co., New York City 17. Bulletin tells about the new 200-amp a-c transformer welder Model MCM 200. It describes construction, ratings and other features.

26 ALUMINUM PIPING—Tube Turns, Inc., Louisville. 4-page reprint of an article, "Welded Aluminum Piping," originally appearing in the August, 1951, issue of THE WELDING ENGINEER. It contains tables on the design stresses allowable for various types of welded piping systems.

27 CYLINDER TRUCK BULLETIN—American Metal Products Co., Worcester, Mass. Single-sheet leaflet pictures a two-wheel truck for smaller cylinders. It accommodates two cylinders up to 9.5 in. in diameter.

28 HEAT TREATING—Diamond Iron Works, Inc., Minneapolis 11. 4-page, two color bulletin NX-1 describes and pictures preheating torches, forges, furnaces, blowers, valves and other heat-treat equipment.

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Not, PLEASE, In the Name of Fairness

Our national Office of Economic Stabilization has adopted a policy of gearing wages to the cost of living. We are told that "escalator clauses," which provide that rates of pay shall be adjusted to take account of changes in the cost of living, will be generally approved.

If the adoption of this policy had been announced as a frank concession to political expediency, it would have been quite understandable. There may very well be votes, lots of them, in a policy which purports to protect the income of a large group against loss through the price inflation caused by the defense program.

A case might even have been made for a policy of approving escalator clauses on grounds of production expediency. The leaders of some three million organized workers now covered by such clauses have indicated that they would fight to the limit to keep them and thus maintain "real wages," that is, wages measured by their purchasing power. The leaders of other organized groups have indicated they would fight to get the benefit of such clauses. Denial of them might mean serious strikes.

Justified "in Fairness"

However, the policy of approving escalator clauses was not based on these relatively low grounds of expediency. It was justified on high moral grounds, on grounds of "fairness." In the words of the President's Council of Economic Advisers, "maintenance of real wages during inflation cannot in fairness be disallowed."

That proposition is false.

It would be truthful to say, "maintenance of real wages during inflation cannot in fairness be allowed."

The truth of the corrected proposition becomes evident immediately when you take a look at the basic nature of the inflationary problem created by defense mobilization.

We are devoting a large share of our national production to defense. The share is now scheduled to hit about 20% in 1952.

Since we are not able to increase our total production fast enough to meet defense needs

in addition to civilian needs, that means a cut in the supply of goods and services that is available for civilian consumption. But the money paid out for the production of defense materials is added to that which is available to buy civilian goods.

Thus, more money is put into the hands of the people to buy less goods. So prices go up. That is inflation.

If one group of people then is granted enough additional money to offset the price increases — and that is the purpose of an escalator clause — and thus can continue to buy as much as they have been buying right along, less goods will be left for other consumers who are not getting this advantage. That is palpably an unfair distribution of the sacrifices necessitated by defense mobilization. In fairness, therefore, maintenance of real wages in inflation cannot be allowed.

Organized workers were not the first, of course, to get the benefit of an automatic adjustment to take account of the increased cost of living. The farmers got theirs first. The price parity formula is, in essence, an escalator clause. The federal government underwrites increases in the prices of the things farmers sell in order to match increases in the prices of the things they buy.

Crucifying the Helpless

As matters stand, two groups are without benefit of escalator clauses. One group is composed of manufacturing firms. While they have not been nearly as successful as the misleading reports of "record-breaking profits" suggest, they have been able to look after themselves fairly well — thus far.

But one group is completely without protection. It is that numerically large but politically unorganized mass of people — many of them old and relatively helpless — who are trying to live on pensions, annuities and other fixed incomes derived from their savings. They are at the end of the line when the increased costs of inflation are passed along. They have no one to whom they can pass the buck. They are being progressively pauperized by the continuing inflation caused by progressive boosting of costs and hence prices.

With the present line-up of pressure groups in Washington, protection for the principal victims of inflation — those who have saved for a rainy day only to find inflation has blown away the roof — is obviously an extremely difficult business. But to have even temporary insulation against inflation granted to powerful groups in the name of fairness should be offensive to the nostrils of a nation that presumes to assert the moral leadership of the Western World.

The only really fair way to handle inflation is to prevent it. But once it is under way, fairness demands that the burdens be as evenly distributed as practicable.

An escalator clause — or a farm parity provision — is explicitly a device to enable the group favored by it to escape the burden of inflation. Whatever concessions we feel we must make to political pressures or production expediency, let us at least be honest enough not to invoke "fairness" as justification for so arbitrary a discrimination in the distribution of the defense burden.

McGraw-Hill Publishing Co., Inc.

"By switching to ANACONDA **828 Welding Rod,** we cut welding time 10 per cent . . . get smoother welds . . . less distortion."

Boiler Erection & Repair Co. operator braze-welding strut into tubular steel assembly with 1/8" ANACONDA 828 Nickel Silver Welding Rod.

"Look at these units," continued Mr. William Raiguel, Plant Supt., Boiler Erection & Repair Company, Philadelphia, Pa. "They're fabricated from 1½-inch, 16-gage carbon steel tubing. Each unit requires six butt welds—about 28 linear inches of weld. The finished units are designed to be part of a heavy-duty farm machine, and every weld must be dependably strong.

"After trying various welding methods and rods we found that by using an acetylene torch with vapor flux and ANACONDA 828 Nickel Silver Welding Rod we get faster, smoother, stronger welds than with any other combination. The low melting point and free-flowing quality of ANACONDA 828 Rod make for faster work and smoother welds that need no finishing. And the low temperature, of course, causes less distortion of the work and reduces the straightening needed."

Braze welding with ANACONDA Welding Rods may cut your production time, cut your costs, improve your products. Your ANACONDA Welding Rod Distributor can help select the right rod. Or write for Publication B-13 to The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

51152

Boiler Erection & Repair Co. operator braze-welding yoke members into position with 1/4" ANACONDA 828 Nickel Silver Welding Rod. No finishing of the weld is required.

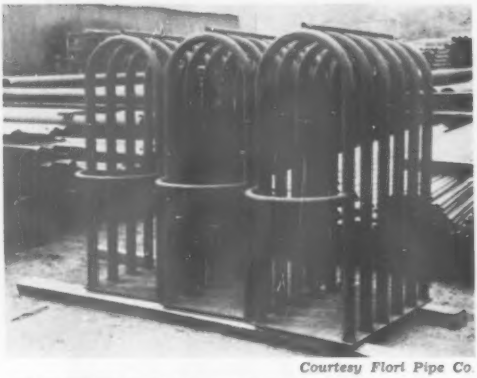
braze or weld with confidence

ANACONDA®
WELDING RODS

on the job

Courtesy Oxweld Railroad Service Co.

FLAME SLICES this 24-in. steel billet like cake to shape big hex nuts for columns of a 250-ton hydraulic press



Courtesy Flori Pipe Co.

EXPLODING TIRES placed inside these cages can only roar; they can't bite the hand that's filling them

Giant Hex Nuts Flame-Cut

GIANT-SIZE hexagonal nuts for column bolts in a 250-ton hydraulic press were flame-cut from low-carbon steel billets 24 in. thick at the General American Transportation Co., Sharon, Pa. A heavy-duty torch mounted on a flame-cutting machine enabled the cutting to be accomplished at a rate of 3 in. per minute.

The procedure was to first cut a hole out of the center of the block, and then slice off the corners to form the hexagon. After the nuts had been flame-cut to shape, the only machining they required was to thread them for their column bolts.

• • •

Smooths Welded Seams

PLANT ENGINEERING department of The Ryan Aeronautical Co., San Diego, Calif., designed and built a special rolling machine to flatten the inert-arc welded seams of stainless-steel exhaust sections. These sections are large tubular parts that have been welded into circular form to serve as aircraft engine exhaust components.

Formerly, the exhaust sections were welded with added filler rod, and the resultant bulge of metal at the seam was ground away manually with a power-driven grinder. It took quite a little time per section to remove the excess weld metal and obtain a smooth finish.

The sections are now inert-arc welded without adding any filler metal. There is, naturally, less excess metal to be removed. Each welded section is drawn between two steel rollers, the heavy pressure of which flattens the weld seam and at the same time improves the weld quality by refining the grain structure of the metal. Only a few seconds are required to run a section through the machine. As compared with grinding, the smoothing operation is ten times as fast.

Ryan's new seam roller is operated by a ½-hp electric motor. The operator places the part between the two rollers and depresses a foot switch. This actuates an air cylinder that forces the upper roll down against the part and against the lower roll. A pressure-operated switch in the air line then starts the motor automatically, causing the parts to be drawn between the rolls. A force of as much as 20,000 lb can be exerted to smooth the seam.

SEAM ROLLER for welds steps up production 1,000% over the former way of grinding off excess metal

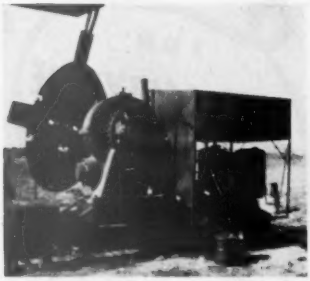
Cage for Wild Truck Tires

INFLATION of the big tires that go on 10-ton and 15-ton highway trucks can be a dangerous business. A weak tube or a break in the casing and *wham*!—it's like an artillery shell exploding. Service station and garage attendants have been seriously injured, even killed, by flying pieces of tire casing or tire irons.

A large trucking operator asked the Flori Pipe Co., St. Louis, to design something that would end this hazard. Flori thought it over and came up with the welded guard illustrated at top right. Placed inside this massive pipe cage, an exploding tire can only roar; it can't bite.

Materials for the guard were six long pieces of 2-in. steel pipe, two shorter pieces of 1-in. pipe and a ¾-in. steel plate to serve as a base. Castors may be fitted to the four corners of the base plate if it is desired to move the guard around the garage or filling station. Each of the 2-in. pipe lengths was bent on a tube bender into a loop dimensioned to provide clearance for the largest size of truck tires. From the 1-in. pipes, two braces were formed: a curved one on the back of the guard and a straight one welded to the tops of the loops to keep the 2-in. pipes in line.

After a truck tire has been repaired, it is rolled into the guard in a deflated condition. The attendant then begins to fill the tire with air, secure in the knowledge that six stout barriers will protect him in case of accident. Though some wild tires have exploded inside these cages, no injuries have resulted.



PROTECTIVE housing for oil-pump engine also stores lubricating oil

Housing for Field Engine

By Elton Sterrett

TO PROVIDE shelter for the engine driving a field oil-well pump, the producing company designed an all-welded housing. It not only protected the engine but also afforded working space for adjustments and allowed for storage of lubricants.

Corner posts of 1-in. rod were welded to lugs fitting the extension of the engine base. To the corner posts were welded sloping top sheet and side sheets of ⅛-in. tank steel. The sides were cut off above engine-top height on three sides: the side toward the pumping unit was carried low to protect the engine from possible oil spray originating at the well head.

Inside the angle of two of the upper side sections, partitions were welded to form two containers. Each container was fitted with a short nipple welded through the roof section; these were covered with screwed-on pipe caps. To the base of the two containers were welded short nipples that carried valves. The two tanks thus formed serve as storage space for engine lubricating oil and oil for the gear box of the reduction mechanism.

To stiffen the housing, braces of ½-in. rod were set into the corners.

* * *

For the "Swipe File"

HERE'S a neat trick for the swipe files of maintenance men, contributed by President Bent Laune, of All-State Welding Alloys Co., Inc. If you are doing phosphor-bronze arc welding and are troubled by pitting and porosity, you can obtain a smooth surface by "surface washing" with a phosphor-copper-silver brazing rod. Use a neutral or excess-acetylene flame and apply a brazing flux. The particular rod Mr. Laune recommends has a working temperature of 1,270 F and is so fluid when molten that it readily flows into and bonds every crack and pit.

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Heavy woven glass fabric pressure bonded with long asbestos fibre provides: (1) enormous resistance to arc heat; (2) excellent electrical insulation; (3) high impact strength. Most practical insulator tip ever built.

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Full butt-to-jaw current is insured in WAGNER electrode holders through exclusive "WAGNERLOY" construction. This special copper alloy imparts extraordinary tensile strength and increases resistance of electrode holder to welding arc heat. Weld-at-any-angle design includes ball and socket swivel joint. Tremendous gripping pressure developed by compound cam and lever system. Chrome Vanadium steel springs permit tension to be adjusted within less than a minute.

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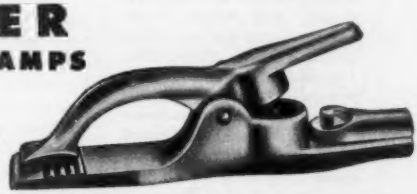

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Beveled lower tong of broad flat base slips underneath and securely grounds flat work. May be used as clamp or plate. Powerful chrome vanadium steel springs easily adjustable. Fully shielded. Immediate delivery possible on heavy—general—and light duty clamps.

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... by "Bronze-Facing" large gear with wear-resistant Ampco-Trode 300*

HERE'S a large 10'6" diameter tube-mill gear with 120 teeth and an 11-inch face. A new one costs $2,148. This one was made better than new by "Bronze-Facing" it with wear-resistant Ampco-Trode 300 for only $530. Time required for the entire job — 82 hours.

You, too, can enjoy the savings in time and money made possible by "Bronze-Facing" with Ampco-Trode. Other advantages are: longer life and less down time. For instance, after 5 months' service in a cement mill, this gear showed little or no wear — thanks to the 300 Brinell tooth-surface hardness provided by Ampco-Trode 300.

In these days of shortages and long deliveries you'll find Ampco-Trode bronze electrodes a big help. Get a supply today from your Ampco distributor or write us.

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33rd METAL SHOW

(Continued from page 60)

Research Foundation, Carnegie Institute of Technology, Massachusetts Institute of Technology, National Bureau of Standards; Harvard, Illinois, Columbia and other universities.

This is the first world meeting in history of top echelon industrialists dealing with steel, alloy and metal production. Its purpose is to assess distribution and potential of the world's metal resources available to the non-communist world but not to exchange information vital to national defense. Special liaison representatives between the World Metallurgical Congress and various departments of the Federal Government have been appointed by Defense Mobilizer Wilson, by the Economic Coöperation Administration, by the State and Defense Department and by the Secretaries of Commerce and the Interior.

Dr. Zay Jeffries, of Pittsfield, Mass., who is known as the dean of American metallurgists, has been appointed to serve as director general of the World Congress. Countries to be represented are: Austria, Australia, Belgium, Brazil, Denmark, Finland, France, Germany, Greece, Holland, India, Italy, Japan, Luxembourg, Norway, New Zealand, Portugal, Sweden, Switzerland, Turkey and the United Kingdom.

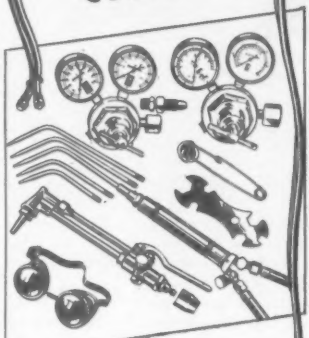
Production for Defense

With the World Metallurgical Congress meeting in conjunction with the Metal Show, the 1951 theme of "Production for Defense" takes on a highly significant meaning. Whether or not there is to be World War III may well depend upon whether or not those countries desiring peace can achieve a firm unity. In the production, processing and fabrication of metals, a unity of purpose and operation can do much to build strength and insure national and world security.

The Detroit event of October 13-19 will be managed by the American Society for Metals, with W. H. Eisenman, ASM national secretary, as managing director and Chester L. Wells as assistant director.

It's going to be a really big-league affair.

FOR
OXY-ACETYLENE WELDING and CUTTING



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Every day more and more fabricators are learning that GB Silver Solder with GB Flux makes an unbeatable production team for low temperature brazing.
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CONVENTION PREVIEW

(Continued from page 47)

Naval Engineering Experiment Station.

David P. Brown, American Bureau of Shipping, is chairman of the ship structure committee. Finn Jonassen, National Research Council, is co-chairman. Papers are:

Welded reinforcement of openings in structural steel plates, by D. Vasarhelyi and R. A. Hechtman, University of Washington.

Evaluation of welding procedure by direct explosion testing, by G. S. Mikhalapov, Metallurgical Research and Development Co.

Investigation of factors which determine welded performance, by C. Hartbower and W. S. Pellini, Naval Research Lab.

Upper and lower transition in Charpy tests, by W. J. Harris, Jr., J. A. Rinebolt and R. Raring, Naval Research Lab.

F. R. Hensel, of P. R. Mallory & Co., is chairman of the resistance-welding session. T. Embury Jones, Precision Welder & Machine Co., is co-chairman. Papers are:

Trends in electronic non-synchronous resistance-welding controls, by Stuart C. Rockafellow, Robotron Corp.

Flash welding of components for aircraft and similar applications, by J. H. Cooper, The Taylor-Winfield Corp.

Fatigue strength of spot-welded light-alloy joints, by H. Kihara, president, The Japan Welding Society.

Wednesday Morning

The three simultaneous sessions for the Wednesday morning period are on production welding, pressure vessels and gas cutting. Chairman of the production welding session is A. E. Lindsey, Ford Motor Co. L. P. Dempsey, American Metal Products Co., is co-chairman. Papers are:

Welding heat exchanger for the chemical industry, by John W. Mortimer, professional engineer.

Product design for welding, by John Mikulak, Worthington Pump and Machinery Corp.

Welding fixtures for use with submerged arc, by L. J. Berkeley, Berkeley Equipment Co.

H. C. Boardman, Chicago Bridge & Iron Co., is chairman of the pressure

New... A-C WELDER for Armor Welding

80-VOLT UNIT BRINGS BETTER ARMOR WELDING WITH LOW HYDROGEN ELECTRODES

In answer to the increased demands of the armament program, Westinghouse has developed an 80-volt machine to obtain better quality welds with low hydrogen electrodes. The new 400- and 500-ampere, 80-volt units supplement the proven 65-volt line. They are equipped with built-in voltage reducing controls.

Primary capacitors are included for raising the primary power factor to approximately 80% at rated load. Units are designed to automatically disconnect all but one of their capacitors during idling. The remaining capacitor furnishes the excitation kva of the transformer. A built-in, 2-pole, F-frame breaker serves as a disconnect switch.

For further information on these new 400- and 500-ampere ratings or on other Westinghouse welding equipment, write Westinghouse Electric Corporation, Dept. DC71, Welding Division, Buffalo, New York.

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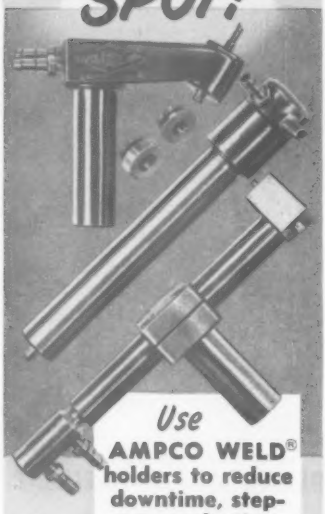
Put resistance welding costs on the SPOT!



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vessels session, L. C. Bibber, Carnegie-Illinois Steel, is co-chairman. Papers are:

Effect of plate-edge preparation on notch toughness, by Dr. S. S. Tör, E. I. duPont de Nemours and Co.; J. M. Ruzek and Dr. R. R. Stout, of Lehigh University, Fritz Engineering Laboratory.

Biaxial fatigue tests on flat plate specimens, by R. U. Blaser, L. F. Kooistra and J. T. Tucker, Jr., The Babcock & Wilcox Co.

Stresses in large horizontal cylindrical pressure vessels on two saddle supports, by Leonard P. Zick, Chicago Bridge and Iron Co.

G. V. Slottman, Air Reduction Sales Co., is chairman of the gas cutting session. H. E. Rockefeller, Linde Air Products Co., is co-chairman. Papers are:

Oxygen cutting of defense equipment materials, by A. H. Yoch, Air Reduction Sales Co.

Heavy scrap cutting, by L. P. Elly, Bethlehem Steel Co.

Powder-washing for metal removal, by R. S. Babcock, Linde Air Products Co.

Wednesday Afternoon

The three simultaneous sessions for Wednesday afternoon are on weldability, stainless steels, welding and brazing. J. Lyell Wilson, consulting naval architect, is chairman of the weldability session, and J. W. Halley, Inland Steel Co., is co-chairman. Papers are:

Relation of notch strains to bend angles in the notched-bend test, by Prof. A. E. Flanigan, University of California, and Ernest M. Emery, North American Aviation Co.

Repeated load tests on welded and prestrained steel, by Dr. S. S. Tör, E. I. duPont de Nemours Co.; J. M. Ruzek and Dr. R. D. Stout, Lehigh University, Fritz Engineering Laboratory.

Micro-mechanism of fracture in the tension-impact test, by W. H. Bruckner, University of Illinois.

Chairman of the welding and brazing session is A. N. Kugler, Air Reduction Sales Co. R. E. Powell, Western Electric Co., is co-chairman. Papers are:

Nested electrodes for metal-arc welding, by W. A. Snyder, University of Washington.

Welding in steel mill maintenance during the defense period, by R. L.

"Jumbo" Goggles You Can Put On or Take Off With One Hand

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When attending the Chicago Safety Show at the Stevens Hotel, October 8 to 12, be sure to see us at Booth 30. We recently developed several new products which will be on display, ready for your inspection. All of them are made of the toughest obtainable material, streamlined for full eye and face protection, extremely light weight to satisfy the present demand, and provide the greatest possible wearing comfort.

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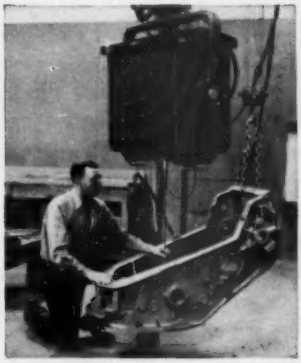
OX-140 — Extremely versatile and efficient . . . with a continuous operating range of from 30 to 140 kvp at 5 to 10 ma. Available in six different models. Invaluable for inspection of low-density metal and other materials.



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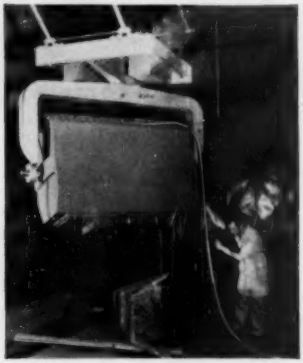
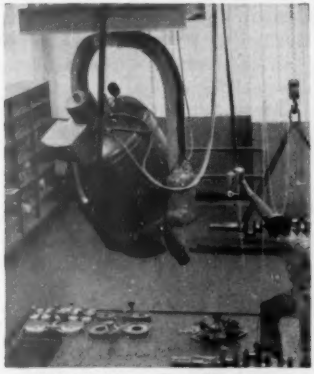


OX-400 — Bridges the gap between low and high-voltage equipment. Where cost prevents installation of higher-voltage equipment, yet penetration of lower-voltage units is insufficient, this 400 kvp apparatus is a natural choice.



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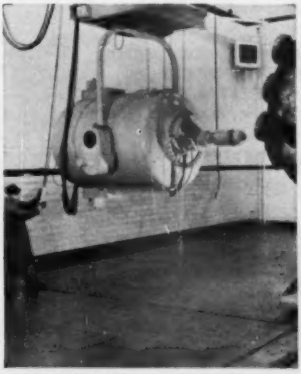

RESOTRON 2000 — As with the Resotron 1000, this two-million volt unit permits the use of the large-field, reflected x-ray beam for simultaneous radiography of many objects in a single exposure . . . Faster, with greater penetrating power.

15 MILLION-VOLT BETATRON — The present-day ultimate where maximum sensitivity is paramount. Your best choice in magnetic accelerators, for speed, sensitivity, and field size for the radiography of heavy-section thicknesses.

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Fast, low-cost metal joining

In joining metals, you always want strong, lasting joints—and you want them in the fastest possible time with the least amount of labor, because that means low cost. Fast, low-cost metal joining is inherent in the make-up and properties of EASY-FLO and SIL-FOS. In fact, with these low-temperature silver brazing alloys you can reduce brazing to a push-button operation and get any output you need.

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BOOTH F-315

Deily, Air Reduction Sales Company.

Dilution and diffusion aspects of brazing, by R. D. Wasserman and Joseph F. Quaas, Eutectic Welding Alloys Corp.

G. E. Claussen, Reid-Avery Co., is chairman of the session on stainless steels. W. O. Binder, Union Carbide and Carbon Research Labs., is co-chairman. Papers are:

Welding of high-alloy steel castings, by R. D. Thomas, Jr., chairman of the WRC committee on this subject.

Structural stability of welded joints between dissimilar metals in high-temperature service, by R. W. Emerson, Pittsburgh Piping & Equipment Co.

Corrosion tests on welded stainless steels, by M. A. Scheil, A. O. Smith Corp.

Thursday Morning

Three simultaneous sessions are scheduled for the Thursday morning period: educational, weldability and inert-arc welding. Professor Robert S. Green, Ohio State University, is chairman of the educational session, and J. Heuschkel, Westinghouse Electric Corp., is co-chairman. Papers are:

Selecting and training welding operators for the defense program, by A. N. Kugler, Air Reduction Sales Co.

Metallurgy for the welding student, by J. D. Paterson, Cass Technical High School.

Tentative standards for school welding shops, by Carl H. Turnquist, Cass Technical High School.

Welding instruction in the public schools, by A. D. Althouse, Detroit Public Schools.

Dr. W. F. Hess, Rensselaer Polytechnic Institute, is chairman of the weldability session. D. H. Corey, of Detroit Edison Co., is co-chairman. Papers are:

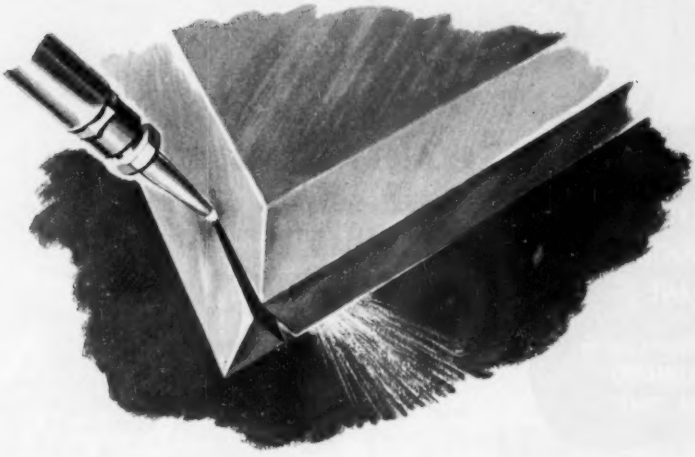
Arc welding of carbon-molybdenum steel pipes, by F. J. Winsor, E. I. duPont de Nemours and Co.

Residual stresses due to circumferential welds in seamless mild-steel pipe, by L. J. Privoznik, Standard Oil Co. of Indiana.

Heat-treating properties of low-hydrogen electrode weld metal, by D. C. Smith and W. G. Rinehart, Harnischfeger Corp.

High-temperature welded joints, by R. H. English, National Alloy Steel Co.

Now! Truly accurate plate-edge preparation to ± 1/16" tolerance *with a flame!*



It's true! Acetogen Fabricators are doing the job that industry thought couldn't be done. They're cutting all thicknesses of armor plate—square edge, bevel edge, multi-bevel edge—so smoothly and accurately that plates fit the welding jig without grinding or finishing.

Right now, the Acetogen Process is speeding vital defense work in the Philadelphia plant of Henry Disston & Sons, Inc. Disston men are as amazed at the tremendous output of Acetogen Fabricators, as they are enthusiastic over the precision of their work.

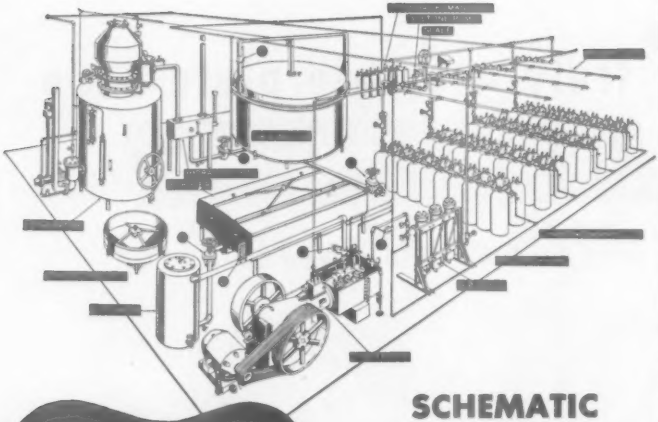
The Acetogen Process will increase production for you, too. We have the organization and flame-cutting "know-how" together with the gas and nozzles; we will act either as consultants, or as sub-contractors—doing the entire job in your plant. *We invite your inquiry.* Acetogen Fabricators, Inc., 522 Commercial Trust Bldg., Phila. 2, Pa.

ONLY THE ACETOGEN PROCESS OFFERS THESE STARTLING ADVANTAGES

- Armor plate of all thicknesses flame-cut to ± 1/16" tolerance!
- The flame-cut plates are ready for welding without grinding, finishing, bridging, or beading!
- Single- and multi-bevels are as easy to flame-cut as square-edges!
- Flame-cut plates have "feather" edges . . . surfaces have sufficiently low Brinell to allow machining.
- No heavy investment needed; the Acetogen Process utilizes standard, readily-available, low-cost equipment and tools.
- Experienced flame-cutters become qualified Acetogen operators within a few days.

ACETOGEN

FABRICATORS, INC. *Originators of precision flame-cutting*



A *Low Pressure*
ACETYLENE
PRODUCING
PLANT
that Charges up to
160 CYLINDERS
at ONE TIME

SCHEMATIC PLANT ASSEMBLY

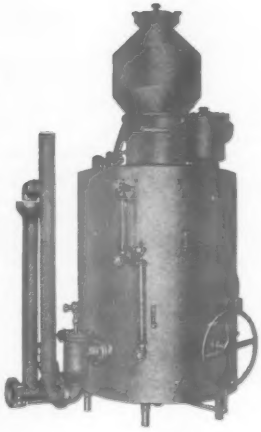
SHOWING LOCATION OF UNITS THAT MAKE UP THE PLANT

This plant layout provides simplest operation at low production costs. Compact design allows operator to watch all operations at all times.

LOW PRESSURE

GENERATOR

This 600-lb. acetylene generator fits into the above plant assembly. It stands out as one of the safest plants manufactured. Automatic controls minimize operating personnel. Rated capacity of the generator and plant assembly is 2700 cu. ft. per hour. The other units are designed for maximum production at minimum costs.



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INDEPENDENT ENGINEERING COMPANY, Inc.
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CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN
O'FALLON 5, ILLINOIS

Chairman of the inert-arc welding session is A. J. Erlacher, United Engineers & Constructors, Inc. Co-chairman is K. L. Walker, Foster Wheeler Corp. Papers are:

Inert-gas-shielded metal-arc welding of magnesium, by Paul Klain, Dow Chemical Co.

Inert-arc metal-arc welding of ferrous metals, by E. diLiberti, Air Reduction Co.

Metal transfer in shielded inert-gas metal-arc welding, by R. T. Breymeier, Union Carbide and Carbon Research Lab.

High-speed consumable-electrode machine welding for aircraft, by Bernard Gross and R. A. Smith, Rohr Aircraft Corp.

Friday Morning

Two technical sessions wind up the program on Friday morning. These are a second session on inert-arc welding and a session on metallizing. Chairman of the inert-arc session is O. H. Kuhlke, General American Transportation Co. H. N. Simms, Black, Sivalls & Bryson, Inc., is co-chairman. Papers are:

Inert-arc metal-arc welding of refinery components and pressure vessels, by S. Yaczko, United Engineers & Constructors, Inc.

Shielded inert-gas metal-arc welding, by H. T. Herbst, Linde Air Products Co.

Performance of high-strength aluminum alloy weldments, by W. R. Apblett and W. S. Pellini, Metallurgy Div., Naval Research Lab.

Thoriated tungsten electrodes—their welding characteristics and applications, by G. J. Gibson and R. O. Seitz, Air Reduction Sales Co.

Walter B. Meyer, Nooter Corp., is chairman of the metallizing session. S. A. Greenberg, technical secretary of the American Welding Society and secretary of the AWS Committee on Metallizing, is co-chairman. Papers are:

Fundamentals of the metallizing process, by F. J. Keller, Aluminum Research Labs.

New developments on metallizing during the past ten years, by Sam Tour, Sam Tour and Co.

Typical applications of metallizing, by K. B. Smith, Dix Engineering Co.

To sum up, it promises to be both an instructive and an enjoyable week. You'll be sorry if you miss the 32nd AWS convention.

JIM, HOW ARE WE GOING TO DO ALL THIS CUTTING AND WELDING...AND STILL MAKE DELIVERY ON TIME?
THAT NEW P&H ELECTRODE IS THE ANSWER, BILL. DH-4, THE FASTEST ROD WE'VE EVER BURNED!

NEW P&H DH-4 Electrode

For high-speed welding — cutting and gouging

...perfect X-Ray welds on heavy metal sections without machining or scarfing

This is the most unusual rod ever developed. It has so many applications that the American Welding Society does not have an AWS number for it.

Because of its wide range of usefulness the new DH-4 rod has shown outstanding economies in welding time and costs.

Here are a few of its many advantages: Fast deposition rate. Easy manipulation. Welds mild steel to mild steel without processing. Has extremely high penetration — 1/4-inch with 1/8-inch rod at 300 amps. Cuts time on horizontal fillet welds, flat butt welds, and vertical down welds. Ideal for gouging and cutting. Gives excellent results on Hadfield manganese and high-carbon steels.

If you want to give your production a lift and reduce your costs, you'll want to know more about the unusual DH-4. See your P&H representative or distributor. Write us for details.

Specialized Training in Metal Welding Fabrication
1 week to 18 months
Harnischfeger Welding Training School
in conjunction with
Milwaukee School of Engineering
Write to P & H today for further details
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Welding Division
4513 WEST NATIONAL AVENUE
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3 SIZES AVAILABLE
1/8", 5/32" and 3/16"
Operates off DC welder on straight polarity or AC welder with minimum open-circuit voltage of 80 volts.

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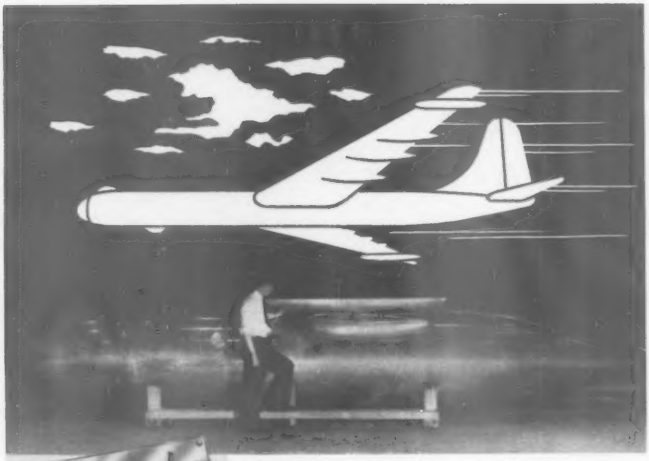
Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer
Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-assembled Houses 2256



Federal RESISTANCE WELDERS USED IN CONSTRUCTION OF LARGEST KNOWN FUEL TANK

The huge external aircraft fuel tank pictured above is one of a type being produced for the Air Forces by the Ryan Aeronautical Company. Designed by Ryan the tanks are fabricated of aluminum alloys, seam welded to MIL-W-6860 (AN-W-30) on Federal Welders where Ryan is making gas-tight seams without the use of sealing compounds.

Federal Resistance Welding equipment enables Ryan to produce a smoothly streamlined tank that has no external riveting or protuberances to disturb the aerodynamic flow over the skin. Too, resistance welding the tanks eliminates added weight.

High production is another important factor and Ryan, like other aircraft and automotive manufacturers, finds Federal Resistance Welders the most efficient method for producing quality assemblies at high speeds.

The latest Federal Three-Phase Aircraft Spot Welder for welding stainless, aluminum, nickel alloys and carbon steels. If you are interested in Three-Phase Resistance Welding be sure to talk with the Federal Representative in your area. There's a reason why Federal is First in Resistance Welding. Send for your copy of the latest Federal Three-Phase Bulletin.

THE FEDERAL MACHINE & WELDER CO.
WARREN, OHIO

Federal® WELDERS
Warco PRESSES®

Tips on Tip Maintenance

Proper care in the handling of the welding or cutting torch will avoid the necessity of much of the maintenance discussed on pages 42-44. Tips for welding and cutting torches, however, must be serviced frequently even if they receive good care.

The carbon deposited in normal welding and cutting operations may cause the tip to carbon up on the outside or the preheat holes to become fouled. Slag may also clog the cutting orifice. Any of these difficulties will impair the operation of the torch even though it has been handled with the greatest care. Wear is an additional problem as it causes a gradual enlargement or "bell mouthing" of the orifices.

The most common torch maintenance job, particularly for a cutting torch, is to clean the torch tip that has become clogged with slag. The easiest way is to clamp the torch in a vise with the tip pointed upward. The special vise jaws pictured in Fig. 4 (page 42) help on this job. With the torch held in proper position, it is generally easy to knock off the slag by lightly tapping the base of the tip. When the slag has been removed, the tip should be taken off the torch for further cleaning operations.

For a bell-mouthed orifice, it will be necessary to remove all of the enlarged portion in order to return the tip to a serviceable condition. This job can best be done by rubbing the flame end of the tip on an emery cloth. The emery cloth should be placed on a smooth, flat surface; the tip should be held in a vertical position when rubbed. It is essential that the tip be held perpendicularly so that the end will be square and smooth. The tip surface should be "sanded down" until all evidence of orifice enlargement has been removed.

Removal of Burrs

When you are truing a tip, burrs will be formed in the preheat and cutting orifices. These must be removed with a tip-cleaning drill. Be sure you select the correct size. Another precaution: be sure to work the drill up and down without any twisting motion. This will keep the orifice from enlarging during the cleaning opera-

tion. In the event the recommended size of drill will not slip into the orifice easily, do not force it. Use a drill one or two sizes smaller and work up to the proper size gradually. Tip-cleaning drills are also the best tools for the removal of carbon deposits from the orifices.

A torch tip may sometimes become carbonized around the seat. You can remove this carbon deposit by heating the tip to red heat, then quenching it quickly in water. This treatment loosens the scale, which may now be removed by simply wiping the tip with a damp cloth.

Heating the tip red-hot anneals it to a certain extent, thus softening its seating surface. However, much of the hardness will be restored if the seat is burnished and dressed in the torch head. If the seating surface is nicked or otherwise damaged, it should be reclaimed as outlined and illustrated in Fig. 1 on page 42.

Straightening Bent Tips

Careless handling sometimes results in a bent torch tip. It may be straightened by placing the tip on a wooden block and lightly hammering it with a rawhide mallet. Be careful not to hit hard: too heavy a blow will not only nick the tip but may also damage the inner gas passages.

After any servicing operation to a welding or cutting tip, test before you put it into service to see, first of all, that it seats properly. If it does, then test the flames.

The flame of the cutting-oxygen jet should be straight and symmetrical to insure a smooth cut. The preheating flames likewise should be symmetrical. Preheating flames of unequal length usually mean gas passages not properly cleaned.

Should the flame pop out when the valve is closed, the most probable reason is that the orifice openings are still bell-mouthed and have not been ground down sufficiently. This means, of course, that the tip should be redressed with an abrasive cloth. Again, make sure that the end is square.

Oxyacetylene equipment, well cared for, will produce the best of gas welds at the lowest cost. The same is true of cutting equipment. Without care, this equipment will deteriorate rapidly; without maintenance, it will soon become useless. Take care of your torch tips!

PAGE *Stainless Steel*

WELDING ELECTRODES

Armor Welding Electrodes
. . . and All Standard Types
AC or DC . . . the BEST
. . . for any weld
on all types
of stainless steel

STAINLESS STEEL has great strength . . . but its strength is limited by the quality of welds which seal the joints. In all kinds of manufacturing—military work in particular—stainless is being used more widely. If you weld stainless, choose electrodes with care.

PAGE STAINLESS STEEL ELECTRODES, AC or DC, give a stable arc under all conditions. The metal flows smoothly. Slag is clean and easily removed. The coating resists cracking down to very short stubs. Now available in 10-lb. lined, hermetically sealed metal cans which can be reclosed. ***Be sure . . . specify Page Stainless Steel Electrodes.***

ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

PAGE WELDING ELECTRODES

Photo courtesy U. S. Steel

PREFABRICATED welded stern weighing 126 tons going into Great Lakes limestone carrier

Photo courtesy U. S. Army

GRENADE-THROWER for infantry is modeled after ancient cross-bow. Spring steel bow has 3/8-in. cable for hurling the grenade

NEWS

63 Young Engineers Split $5,000 Awards

LINCOLN Arc Welding Foundation, Cleveland, has given cash awards totaling $5,000 to the 63 young engineers competing in this year's engineering undergraduate award and scholarship program. The winners represent 34 different engineering schools in 28 states. Funds totaling $1,750 were also awarded to three engineering schools to establish scholarships in honor of the engineers receiving the main awards.

The top award winners are:

Hugh M. Rush, Purdue University, first award of $1,105.03 for his paper, "Hydraulic Cranes for Military Vehicles." Purdue will receive an additional $1,000 to establish four scholarships in the department of mechanical engineering.

Walter H. Halstead, Lafayette College, second award of $552.50 for paper, "A Comparison of Riveted and Welded Design on a Through Plate Girder Railroad Bridge." Another $500 goes to establish two scholarships in the Lafayette department of civil engineering.

Paul E. Potter, Oregon State College, third award of $276.25 for paper, "An All-Welded Steel Bridge." Oregon State received $250 for a scholarship in the department of civil engineering.

This year's program is the fourth of its kind to be conducted among engineering undergraduates for the best papers on the design, fabrication, research of machines or structures in which arc welding is used. Dates for the next competition are from June 1, 1951, to May 31, 1952.

* * *

126-Ton Welded Section Built for Lakes Ship

THE LARGEST self-unloading limestone carrier ever built on the Great Lakes has a 126-ton welded prefabricated steel section for a stern (see left photo above). The 666-ft ship will join the fleet of the Bradley Transportation Company, a U. S. Steel subsidiary. The single stern section was floated into position on a dry dock, then "launched" ashore on greased timbers. Three cranes then lifted it into position.

The shipbuilder is the Manitowoc Shipbuilding Co., Manitowoc, Wis.

* * *

New Oxygen Plant for Ashtabula, O.

OXYGEN and argon for the steel and metalworking industries in the Ashtabula, O., area will be produced by a new Linde plant. Its capacity will be about 40% of the big Linde plants at East Chicago, Ind., or at Kittanning, Pa.

Completion is scheduled for the late spring or early summer of 1952. The plant will be built on the property of the Electro Metallurgical Co. (another division of Union Carbide and Carbon Corp.) on Lake East Rd., Ashtabula.

* * *

IAA 1952 Meeting to Be in Indianapolis

INDIANAPOLIS has been selected as the site of the 1952 convention of the International Acetylene Association. The Claypool Hotel will be headquarters for the three-day meeting, scheduled to be held from March 31 through April 2.

This will be the first time that the IAA convention has been held in Indianapolis, a city whose name is associated historically with the development of acetylene lighting.

* * *

Georgia Tech Men Win Eutectic Contest

J. M. MARTIN and C. L. Ramsey, both of the School of Chemical Engineering, Georgia Institute of Technology, Atlanta, were awarded first prize of $500 in a nationwide contest sponsored by the Eutectic Welding Alloys Corp., Flushing, N. Y. The $1,000 prize competition was for papers on technological and research aspects of the use of lower-melting-point filler metals in non-fusion welding. Fifteen secondary prizes were awarded.

The coming year's competition will have $2,000 in prizes, Eutectic promises.

* * *

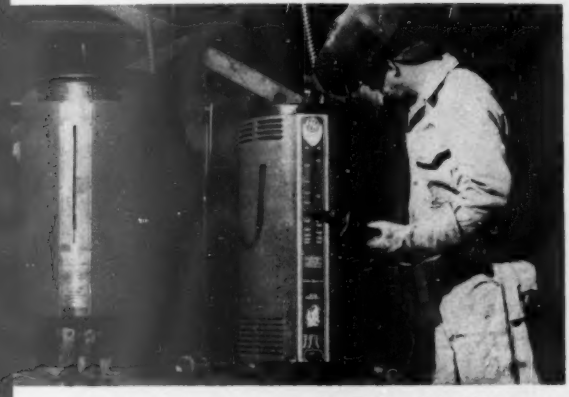
Three Tons of Steel Poured Every Second

STEEL FURNACES of the United States were still pouring over three tons a second during August, the high rate attained in March. The operating rate of the steel industry for the week beginning Aug. 27 was scheduled to be 99.8% of capacity, according to the American Iron and Steel Institute.

Here, Alco welders help meet production schedules on locomotive frames, vital to defense, by using G-E a-c welders. AC welders eliminate troublesome arc-blow encountered when welding high-tensile steels with d-c equipment.

100% A-C WELDED!

Here's How Alco Produces Road Locomotive Frames with G-E Welders



Shown above are two of the many G-E a-c welders used at Alco.

Corners can be difficult to weld, but the absence of troublesome arc-blow with G-E a-c welders enables this operator to lay an even corner bead in any position.

Diesel-electric road locomotive frames are 100% a-c welded at the Schenectady, N. Y., plant of American Locomotive Company. Alco welding engineers report that General Electric a-c welders eliminate troublesome arc-blow, make for easy striking, cost less than d-c, use less power and are easily maintained.

Like the American Locomotive Company, you may also find that you can speed production by using G-E a-c welders. For example . . .

YOU CAN WELD BETTER WITH AC

You have complete control of the arc in all positions because G-E a-c welders eliminate troublesome arc-blow. This reduces the danger of undercutting and slag inclusions and produces better welds.

YOU CAN WELD FASTER WITH AC

In almost every case you can use higher currents and larger electrodes. That means more footage. Users report increases of 10 to 50%.

YOU CAN WELD AT LOWER COST WITH AC

G-E a-c welders cost less than d-c equipment of the same rating. They use only one-fourth as much power when idling and have much lower load losses. And because there are no rotating parts, maintenance is practically negligible.

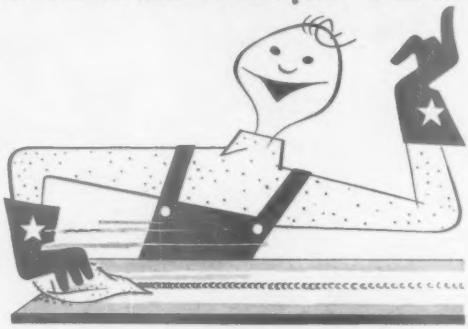
SEE YOUR G-E WELDING DISTRIBUTOR!

He's listed in the yellow pages of the telephone directory. Just look for General Electric under "Welding Equipment." Your distributor carries a complete line of welders, accessories and electrodes. General Electric, Schenectady 5, N. Y.

GENERAL ELECTRIC

711-17

WIPE WELD SPATTER CLEAN



Don't fight with weld spatter! Wipe it off in a flash and save up to 85% of weld cleaning labor. Simply brush Protect-O-Metal No. 2 on weld area and adjacent surfaces, weld, and unsightly troublesome weld spatter wipes clean with a dry cloth. Get smooth, clean welds ready for painting if desired. P.O.M. No. 2 causes no smoke, fumes or odors; contains no organic ingredients. One coat serves for single or multi-pass welds, costs a tenth of a cent per foot of weld, saves up to three times its cost in time alone. Order a trial gallon ($3.25).

PROTECT-O-METAL

POM

GWSMITH

G. W. Smith & Sons, Inc. 5408 Kemp Rd., Dayton 3, O.

Tippy Says: ERIC THE RED THOUGHT A LOT OF HIS SHIELD, IT WAS A WELDED DEAL!

Tippy Says: . . . Take a tip, try TIPALOY!

That welded shield sure got Eric out of many a spot . . . why . . . because it was made of the finest materials, built to last. TIPALOY Resistance Welding Electrodes are made of the finest materials, and manufactured to out wear any other ordinary electrode on the market . . . once you use TIPALOY Resistance Welding Electrodes you will be convinced that they will get you out of many a tough production problem.

Write today for test samples and "the story of STRAIGHT LINE conductivity!"

Tipaloy INC. 1435 EAST MILWAUKEE DETROIT 11, MICHIGAN

No. 5 of a Series

Branches in All Principal Cities

Aluminum Polish Removes Seam-Welding Residue

AFT FUSELAGE sections for the big C-97 "Stratofreighter" have a thin 2S aluminum coating over 24ST aluminum skin. To remove surface mars from the 2S coating without reducing its thickness, Ryan Aeronautical Company, San Diego, developed a new polish. It is said to remove the varicolored stains aluminum skins acquire in fabrication and to produce a uniform sheen that approaches mill finish.

Second use for the polish is to remove the tiny bits of copper left along seam welds by the welding wheel. Copper and aluminum make an electrolytic corrosion condition possible.

According to B. W. Floersch, Ryan's chemical research engineer, the new polish contains 4 lb of 400-mesh silica to a gallon of water solution. The fine-mesh, uniform-grain silica gives a "roller bearing" action on the surface without grinding into it. An organic suspending agent keeps the polish from packing.

The polish is applied to the aluminum on a cloth dampened with water. After gently rubbing it into the skin, the operator removes any excess with another moist cloth. No other water is required.

* * *

ASM to Publish World Multi-Language Journal

WITH AN allocation of $50,000 from the board of trustees of the American Society for Metals, the world's first multi-language journal in the field of metal science is off to a flying start. The $50,000 is to finance two-year preparations toward getting out an "International Journal of Metal Science."

Two top metalists from each of 22 nations are being selected to set publication policy. They will meet for this purpose at a special session of the World Metallurgical Congress this month. Until a world representative board of governors is selected, the ASM board of trustees will be publishing agency for the new paper.

Under present plans, an article by a contributing writer will be published in the language in which he wrote it. Abstracts in English will be prepared to aid American readers.

* * *

Texas Fabricator Changes Name

NEW NAME of the Mason Brothers Construction Co., Houston, Texas, is the Southwest Steel Plate Division, a subsidiary of Southwest Steel Products. Products include pressure vessels, tanks, gas line, chemical plants and steel supplies for oil refineries.

IMPROVED WELDS WITH

RUFLUX P Manufacturers of welding rods find that welds of superior quality are produced when TAM Ruflux P is included in the rod coating formulation. RUFLUX P aids in arc stabilization and the formation of satisfactory slags. Complete information sent on request. Write our New York office *today*.

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for

RESISTANCE WELDING HOLDERS

- ☑ Water Flow
- ☑ Conductivity
- ☑ Simplicity of Design
- ☑ Simplicity of Maintenance
- ☑ Rust Proof
- ☑ Durability
- ☑ Non-Magnetic Throughout

Summary

WW WEIGER-WEED O.K. on all counts

WEIGER-WEED

ELECTRODE HOLDERS

Weiger-Weed Ejector Type Holders represent the closest approach ever made to an absolutely trouble-free resistance welding holder. Designed and built for the most severe conditions in resistance welding, they have proved themselves in thousands of hours of failure-free service. Weiger-Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Ave., Detroit 4, Michigan.

Send for this free booklet of latest information on Resistance Welding

To Consider Specifications for Arc-Weld Filler Metal

AN IMPORTANT item on the program of the 32nd convention of the American Welding Society (see page 45) will be a symposium on filler-metal specifications for inert-gas and submerged-arc welding. The symposium has been organized by the AWS-ASTM Committee on Filler Metal to find out whether or not there is a need for such specifications. It will be held on Thursday afternoon, Oct. 18, starting at 2:00 p.m.

Three questions will be considered: (1) Is a filler metal specification necessary? (2) If so, what are the pertinent factors that should be included? (3) Why are these factors necessary and how should they be controlled?

O. R. Carpenter, of The Babcock & Wilcox Co., will serve as chairman and J. H. Humberstone, of Air Reduction Co., Inc., as co-chairman. The problems as they pertain to aluminum and magnesium will be discussed by: H. F. Buschow, Hydrocarbon Research, Inc.; L. M. Crawford, Boeing Airplane Co.; O. H. Kuhlke, General American Transportation Corp.; C. A. Loomis, Navy Department, Bureau of Ships; T. E. Piper, Northrop Aircraft, Inc. General discussion will be led by G. O. Hoglund, Aluminum Co. of America.

Problems pertaining to stainless steels will be discussed by: W. B. Bunn, The M. W. Kellogg Co.; L. P. Elly, Bethlehem Steel Co.; Walter Mehl, Heintz Mfg. Co.; P. C. Arnold, Chicago Bridge and Iron Co. R. David Thomas, Jr., of Arcos Corp., will lead the general discussion.

Copper and copper alloys will be discussed by: John Kelley, Vulcan Copper and Supply Co.; J. W. Mortimer, Whitlock Mfg. Co.; L. H. Hawthorne, Revere Copper and Brass Co., and Harold Robinson, Air Reduction Research Laboratories. General discussion will be led by F. E. Garriott, of Ampco Metal, Inc.

Mild and low-alloy steels will be discussed by: N. C. Jessen, The Babcock & Wilcox Co.; T. M. Jackson, Sun Shipbuilding & Dry Dock Co., and L. C. Stiles, Chicago Bridge and Iron Co. David Swan, Union Carbide and Carbon Research Laboratories, Inc., will lead the general discussion.

* * *

$30,000,000 Plant for Jets to Be Built near Detroit

THE U. S. NAVY will build for the Department of Defense a $30,000,000 plant in the Detroit area, to be used for the assembly and testing of jet aircraft engines. Chrysler Corporation will operate the plant.

THE ARC-FIT PROCESS

Tube notched with special ARC-FIT
Angular notch on tubular member.
Square tube notched to fit square pipe.
Angle joint on two pipes.
"Y" notch on end of Tubular member.
Pipe Notched with deep slot.
"T" joint on tube or pipe.
Angle Iron notched to fit pipe.

TOPS IN SHOP EFFICIENCY

5 seconds to notch Tubing and Pipe Ends

The answer to many problems confronting large and small shop owners. No shop can afford to be without the ARC-FIT—no matter how large or how small. Manual or power operated—fits the ARC-FIT hand press or any standard power press.

ARC-FIT is a patented precision-built shearing tool which prepares the ends of tubing or pipe to produce welded or brazed tubular "T" or angle joints. ARC-FIT will not deform the tube or pipe and no further finishing is required—no sawing, cutting, or removing sections with milling cutters. Our literature gives many fine points on operation, construction, and application—send for it today—also write for quotations.

VOGEL TOOL & DIE CORPORATION

1825 N. 32ND STREET
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MELROSE PARK, ILL.

Production Life Increased 900% by Hard-Facing Here

. . . and still no sign of wear!

A 3/16-in. layer of HAYNES STELLITE hard-facing alloy protects this punch mandrel from severe wear and galling. The hard-faced mandrel, used in the manufacture of pipe couplings, has already produced 10,000 pieces and still shows no sign of losing gage. Tool steel parts in this same service wore out after punching only 1,000 pieces; and punches of case-hardened steel had to be replaced after producing 500 couplings.

The couplings are made from pipe of 1/8-in. wall thickness and 5 5/16 in. diameter. Under a pressure of 20 tons, the pipes are expanded to 6 7/8 in. in diameter at the rate of one every two minutes. In this severe forming operation, the hard-faced ring on the mandrel stays out-to-gage 10 times as long as a tool steel ring and 20 times as long as a case-hardened steel ring. In addition, it does not gall and mark the inside diameter of the pipes.

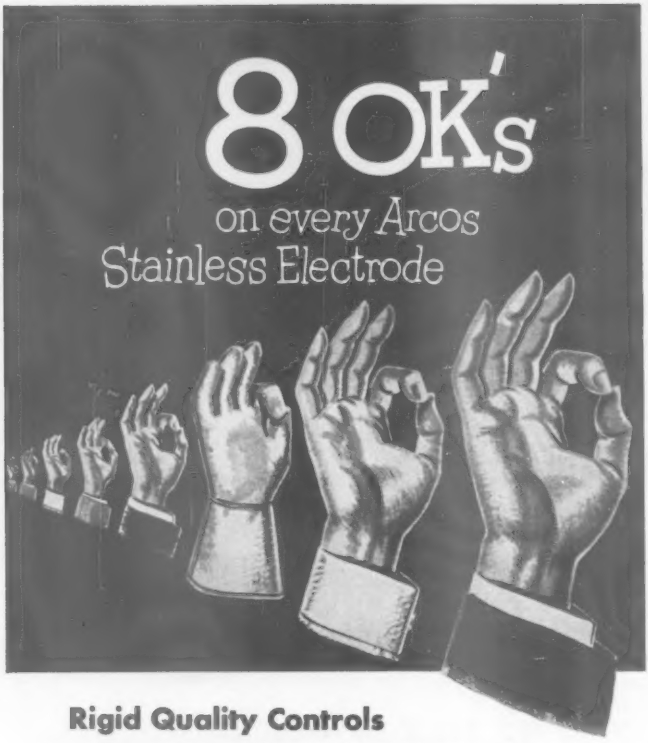
Hard-facing is often the answer to serious wear problems in all types of machinery and equipment. By reducing wear at key points, it helps to cut maintenance costs and keep machinery running at peak efficiency.

If you visit the National Metals Exposition in Detroit, be sure to see our display of hard-facing materials and other HAYNES alloy products in Area F-440.

HAYNES TRADE-MARK *alloys*

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.



Rigid Quality Controls
GUARANTEE Better Weld Metal

• There's no room for guesswork in manufacturing Stainless Electrodes that will produce consistently high quality welds on every application. That's why the raw materials that go into Arcos Stainless Electrodes must meet rigid specifications . . . why every electrode must pass so many quality tests before it's put to use. It means complete assurance that the weld metal will be physically, chemically and metallurgically right for the job you want to do.

ARCOS CORPORATION
1500 South 50th Street • Philadelphia 43, Penna.

WELD WITH

ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

Our Front Cover Shows What Welding Does in the War

SALUTING the role of welding in modern-day fighting forces, this month's front cover of THE WELDING ENGINEER displays scenes from Army and Navy activities. The speedy and powerful torpedo boat is the USS PT 810 on a practice run in Chesapeake Bay. She is all aluminum and was half-welded and half-riveted by the Bath Iron Works, Bath, Me. Since her launching, there has been built at least one other all-welded aluminum PT boat.

A paddle-foot extension for sloppy going in muddy fields or paddies is being flame-cut off a light tank in another photo of the montage. Still another Army scene shows ordnance men welding the axle of a 1-ton trailer.

Inert-arc welding repairs a J-33 jet flame tube at Chanute Air Force Base in Illinois. The weldor is Sgt. Thomas Alley, instructor in the aircraft weldor's school at Chanute. (Illustration at upper left.

When air strips are hacked out of rough hill and mountain country, it's rough on airport construction equipment. If you look closely, you will see an Army welding class repairing a sheep's-foot roller that is used to pack down airstrips.

A broken part for a railroad engine is being welded by T/4 Edward I. Huber, Cincinnati, in another picture. Huber belongs to the 742th Railroad Operation Battalion.

The last of the seven scenes on the cover montage shows rust and excess steel being taken off the new M46 A-1 General Patton tanks in a burning-out process. A medium tank, the Patton weighs 48.5 tons and has a crew of five men. The photo was taken at the Detroit Arsenal.

• • •

More Steel to Come from Venezuela Ores

THE SOUTH AMERICAN country of Venezuela has not hitherto been much of a factor in the steel industry of the western hemisphere, but the situation is expected to change radically when mining operations get in full swing two or three years from now. Imports of iron ore from Venezuela are then expected to rise to more than 10,000,000 tons annually.

Two major deposits are now being exploited by steel companies from the United States in the area near the junction of the Orinoco and Caroni rivers. Venezuelan spokesmen believe that there is more iron ore here than has been produced from Lake Superior's famed Mesabi Range in its 66-year history.

Three Men Honored By American Metal Society

PRESENTATION of three top awards will be a feature of the annual dinner of the American Society for Metals, to be held on October 18 during the Metal Show.

The Sauveur Achievement Award will be given to Dr. Robert F. Mehl, head of the department of metallurgy at Carnegie Institute of Technology, Pittsburgh. He is the 15th man to receive the award since it was established in 1934 and given to Dr. Albert Sauveur, late Harvard professor. He is one of the country's noted authorities on general metallurgy.

Dr. Paul D. Merica, executive vice-president, International Nickel Co., New York, is the 1951 recipient of the Gold Medal of the American Society for Metals. This award was established in 1943 to recognize outstanding metallurgical knowledge and ability in the diagnosis and solution of diversified metallurgical problems. Dr. Merica is a top authority in the development of light metals, especially for airplane construction.

The 1951 ASM Medal for the Advancement of Research will go to Gwilym A. Price, president of Westinghouse Electric Corp. Mr. Price has consistently sponsored metallurgical research and development and by his foresight and influence has helped substantially to advance the arts and science related to metals. His company made available a total of $50,000,000 in 1950 for programs of research and engineering. He has been with Westinghouse since 1943 and president since 1946.

* * *

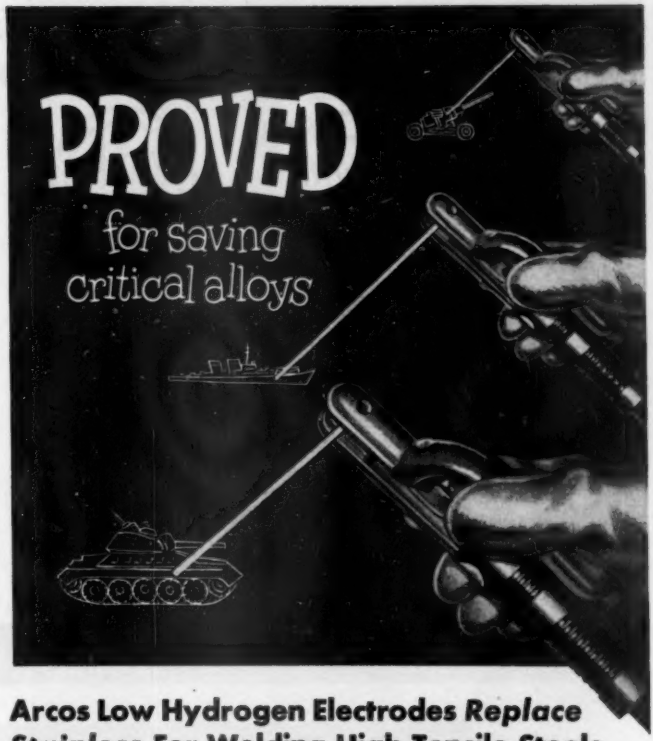
Louisiana Welding Supply Holds Open House

NEW BUILDING of the Louisiana Welding Supply Co., 1931 Plank Road, Baton Rouge, La., was the scene of a gala open house on July 20. The building combines warehouse facilities with an attractive display room and offices that are air-conditioned. Joint owners of Louisiana Welding Supply are Paul E. Haygood, of Baton Rouge, and C. O. Stillwell, of New Orleans.

* * *

Editor Jefferson to Talk in Canada

TED B. JEFFERSON, editor of THE WELDING ENGINEER, will talk on the subject of maintenance welding to four sections of the Canadian Welding Society this month. He will appear before the Toronto section on Oct. 1; the Hamilton section on Oct. 2; the Welland section on Oct. 3, and the Kitchener section on Oct. 4.



Arcos Low Hydrogen Electrodes *Replace Stainless* For Welding High Tensile Steels

● Each day sees a growth in the requirements of nickel and chromium for defense production. The increased use of low hydrogen electrodes on welding high tensile steels is helping to free more of these critical alloys.

ARCOS low hydrogen electrodes are far removed from the experimental stage—they've already been "time tested and approved" on armor welding, as well as commercial applications. With them you get trouble-free, uniform welding performance because every one must pass the same rigid quality controls set up for Stainless.

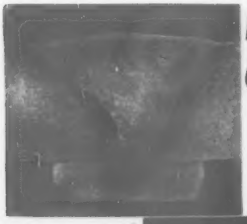
ARCOS CORPORATION

1500 South 50th Street • Philadelphia 43, Penna.

WELD WITH

ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes



For Slag-Free Welds and Complete Fusion

Clean with CMD

CHIPPING HAMMERS

Note above how improper cleaning has left slag in the seam, resulting in poor fusion.

Note the complete fusion and good penetration which result when a weld is properly cleaned.

CMD TYPE CB HAMMER
A favorite for many years, this hammer with wood handle is 3 tools in one — drift, chisel and wire brush.

Experienced weldors know that to have strong welds all slag must be removed after laying each bead. For this job many prefer a CMD Tri-Purpose Chipping Hammer such as the CB shown here or the EB or FB which have steel handles. Ask your dealer to show you the complete CMD line.

Write for descriptive circular W-9 and FREE 16 page Booklet "How to Clean Welds".

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 WEST 46th STREET • CHICAGO 9, ILLINOIS

MAXIMUM RESULTS AT MINIMUM COSTS

REPOINT Worn Shovel and Dipper Teeth with MANGANAL

U. S. Patents 1,876,738 - 1,947,167 - 2,021,945

11% - 13½% Manganese-Nickel Steel

WEDGE BARS

WORN TEETH repointed with MANGANAL Wedge Bars cost less and usually outlast new ones—practically eliminate build-up welding time.

MANGANAL is tough and durable . . . thrives under impact and abrasion . . . workhardens up to 550 Brinell.

Available in 23 sizes to fit any worn tooth. For greatest strength attach with MANGANAL Welding Electrodes.

FREE— Helpful Literature on newest methods for speedy and economical repairs.

WRITE TODAY!
NEAREST DISTRIBUTOR UPON REQUEST

STULZ-SICKLES CO. SOLE PRODUCERS
92 N. J. Railroad Ave, Newark 5, New Jersey

Red Feather Reminds You about Community Chest

DOUBLE significance is carried by the "Red Feather" symbol, reproduced on page 31. This year funds have to be raised for both the Community Chests of American and the United Defense Fund.

The latter, the UDF, is a new national federation, designed to finance the special health and welfare services made necessary by the defense effort. A big part of its budget is for the reactivated USO: a smaller amount will go to community facilities strained by the defense effort.

There is an urgent need for 125 additional USO clubs in this country because of the large numbers of men in training—only 15 will be established in 1951. The remaining 110 will have to wait until UDF raises funds for 1952.

Community chest funds go to help such diversified needs as boys clubs, maternity homes, aid to handicapped people, summer camps, hospitals, travelers aids, visiting nurses, girl scouts, clinics and services for the aged.

The Red Feather is a symbol of 15,000 health, recreation and welfare services who combine their annual appeals in more than 1,300 local Community Chest campaigns. They need a lot of help, more than ever this year. Won't you be one of the helpers?

• • •

Thor Cincinnati Branch Moves

CINCINNATI branch of Independent Pneumatic Tool Co., Inc., manufacturer of portable power tools, has transferred its offices to a new building at 3726-28 Floral Ave.

Republic Steel Photo by Landesman

FOREST OF PIPES shades workman flame-cutting 4,100 pilings for foundation of four open hearths

Excellent Program Planned for SNDT's 11th Convention

A VARIED bill-of-fare on the four major types of non-destructive testing methods — radiography, magnetic testing, ultrasonics and penetrants—is offered for the 11th annual meeting of the Society for Non-Destructive Testing, Inc., Oct. 15-18 at the Flamingo Room of the Hotel Detroiter, Detroit.

The first of the Society's eight technical sessions, to be given on Monday morning, will be on ultrasonic testing. Papers will cover the use of the sonic comparator on grinding wheels, the ultrasonic testing of railroad rails, and curved crystal developments.

A magnetic-particle session will be held Tuesday morning. Papers will be given on: pick-up and recording of magnetic-leakage fields, photoelectric scanning of magnetic-particle indications, and multidirectional magnetic-particle inspection.

For radiography, four papers will be presented on Tuesday afternoon. These are on: the T-V pick-up of X-ray images, T-V pick-up of X-ray images with pin-point aperture, X-ray detectors for automatic inspection applications, and intensifying of the brightness of fluoroscopic images.

A symposium on ordnance material testing will be held Wednesday morning to discuss inspection problems in the manufacture of tanks, gun mounts and small arms. A similar symposium on jet engine part inspection will be held Wednesday afternoon. The Society's Honor Lecture will be given on Thursday afternoon by Donald M. McCutcheon, of the Ford Motor Co.

* * *

Welded Cleveland Hospital Features a Square Plan

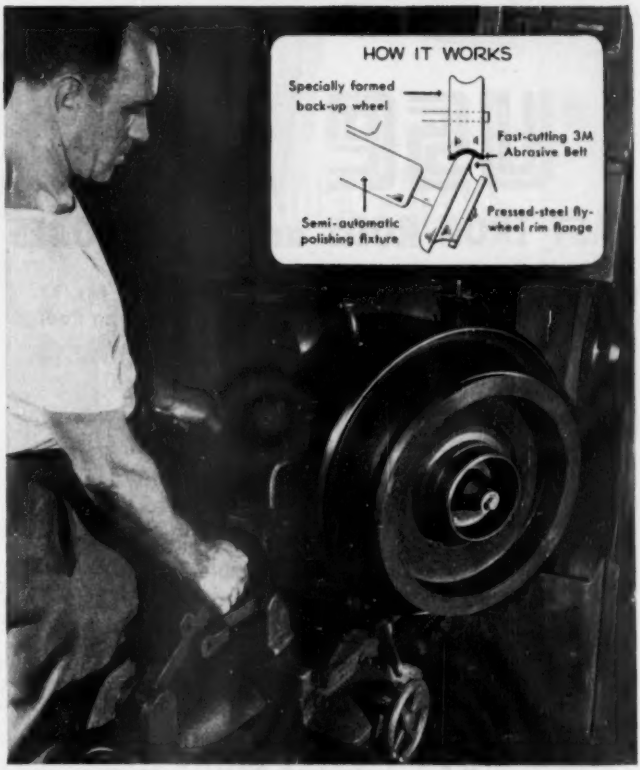
SERVICE to any patient in 30 seconds will be possible in the new Euclid-Glenville hospital in Cleveland, first welded hospital of square design ever built, according to The Lincoln Electric Co.

The six-story all-welded framework places patient's rooms around the outside walls, nursing and service centers in the central core. The building was erected by the American Bridge Co., using four Diesel-driven welders.

* * *

Alcoa Adds New Building to Research Laboratories

ALUMINUM Co. of America is erecting a new building at its Aluminum Research Laboratories, New Kensington, Pa. According to Dr. Francis C. Frary, Alcoa director of research, the new unit—measuring 80 by 170 feet—will increase total floor space by about one-third.



SEMI-AUTOMATIC polishing fixture spins and turns 20" pressed-steel wheel against 3M belt. Back-up wheel is formed to mate with curve of flywheel flange.

"Formed-wheel" belt grinding cuts 3-step job to one!

3M ABRASIVES SLASH GRINDING TIME 71% AT AMERICAN TYPE FOUNDERS

Time study figures prove it! Formed back-up wheels and 3M Abrasives are saving American Type Founders $1.15 on every "Little Giant" press flywheel they finish. A one-step operation now gives these wheels a smoother, cleaner surface in only 7¼ minutes instead of 25 minutes with the former 3-step method, saving 71% on time alone.

Diagram above shows how formed back-up wheel matches the contour of the flywheel rim.

You can make savings in time and money on *your* heavy grinding and finishing by consulting one of our experienced Methods Engineers. No obligation! Write Dept. WE 101 for this 3M consultation service.

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Adhesives. General Export: Minn. Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N. Y. In Canada: Minnesota Mining & Mfg. Co. of Canada, Ltd., London, Canada.

FuseWell

CAST IRON RODS and ELECTRODES

The Name To Specify When You Buy!
SOLD THRU LEADING DISTRIBUTORS

- SQUARE "Fuse-Well" No. 11 (Cast Iron Gas Welding Rod)
- SQUARE "Fuse-Well" No. 14 (Moly Hi-Strength Rod)
- SQUARE "Fuse-Well" No. 16 (Hard-Surfacing Rod)
- ROUND "Fuse-Well" No. 19 (Hard-Surfacing Electrode)
- ROUND "Fuse-Well" No. 22 (Machineable Coated Electrode)

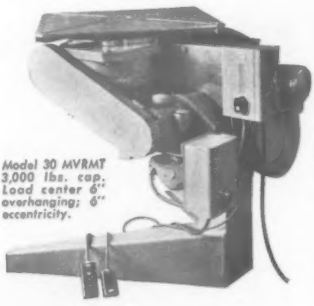
"Flux-Well" WELDING FLUXES

"Fuse-Well" CAST ALUMINUM WELDING RODS

THE CHICAGO HARDWARE FOUNDRY CO.
"DEPENDABLE SINCE 1897"
2500 N. COMMONWEALTH AVE., NORTH CHICAGO, ILL.

now...*ALL* awkward position welding made easy with

WELDMORE
The POSITIONER
with Production in Mind



Model 30 MVRMT 3,000 lbs. cap. Load center 6" overhanging; 6" eccentricity.

Check These Advantages–

- All gearing precision machine cut for minimum back lash. Smooth operation both on rotating and tilting. Impact loading minimized for safety.
- Variable power table rotation — with variable table elevation changes.
- Push button hand control; 135° table tilt with safety limit stops.
- All steel construction.

Send for complete specifications on this and other models, having capacities of 7,500; 18,000; and 25,000 lbs.

PANDJIRIS WELDMENT CO.
5151 NORTHRUP – ST. LOUIS 10, MO.

WELDING GANTRIES—WALL TRACK PLANOGRAPH WELD ARMS—TURNING ROLLS—TANK JIGS—TUBE BENDERS—HYDRAULIC COIL MANDRELS—SPECIAL POWER WELD TOOLS

Lick a Stamp—and Help Lick the Scrap Shortage

STEEL FOUNDERS' Society of America is distributing tens of thousands of two-color sticker stamps as reminders to be used in the national drive to alleviate the critical shortage of iron and steel scrap. The stickers are about the size and shape of postage stamps and carry the simple message: "Help Defense . . . Steel Castings Call for Scrap."

"For every ton of steel castings needed for defense, approximately one ton of steel scrap must be available," explained F. Kermit Donaldson, executive vice-president of the Steel Founders' Society.

It is no secret that steel companies were scraping the bottom of their stock piles of scrap in mid-summer, a time when inventories normally begin to increase for the winter months. The period of greatest steel production required some 12 to 13 million net tons of purchased scrap in the first half of 1951, a record high amount, reports the American Iron and Steel Institute. Yet last year iron and steelmaking furnaces consumed a record 53,700,000 tons of scrap, about 22,000,000 tons of which had to be purchased from outside sources. (Steel plants, in the course of operations, ordinarily produce about 58% of the scrap they consume.)

Under this drain, supplies at some steel plants declined to only a few days' reserves and have shown little tendency to recover. Industrial and agricultural consumers of iron and steel products, machinery and equipment are being asked by steel companies to collect unused, broken or obsolete items and sell them to scrap dealers.

Remember: for each 1,000 tons of steel, 505 tons of scrap and 580 tons of pig iron were last year charged into the furnaces.

* * *

British Welding Researchers Play Host to Visitors

SOME 60 visitors were welcomed by the staff of the British Welding Research Association when the International Institute of Welding convened last summer. The visit was paid to the research station, Abingdon Hall, near Cambridge.

A tour of the station lasted more than 1½ hours and included exhibits of an argon-shielded, self-adjusting metal-arc set-up for welding aluminum, oxygen cutting and resonance fatigue testing as applied to welded pipe and fillet welded bridge members.

—McGraw-Hill World News

Battelle International to Be Set Up for Research

BATTELLE International, a new international research institute, is being launched this fall with laboratories and offices in several countries of western Europe. It is an offspring of the Battelle Institute, Columbus, O., the world's largest industrial research foundation. As in the parent company, the new European institute will conduct researches in the fields of applied chemistry and physics, metallurgy, fuels, ceramics, electronics, theoretical and applied mechanics, the engineering sciences and agriculture.

According to Battelle Director Clyde Williams, the first year's operating costs of the new institute will probably exceed $1,500,000. "This money will not be a contribution; it is an investment," said Williams.

* * *

Two Firms to Study Commercial Isotopes

THE ATOMIC Energy Commission has accepted two proposals from private firms to study the commercial possibilities of manufacturing, processing and selling radioisotopes. The firms are the Bendix Aviation Corp., Detroit, and Tracerlab, Inc., Boston. They will conduct the studies at their own expense.

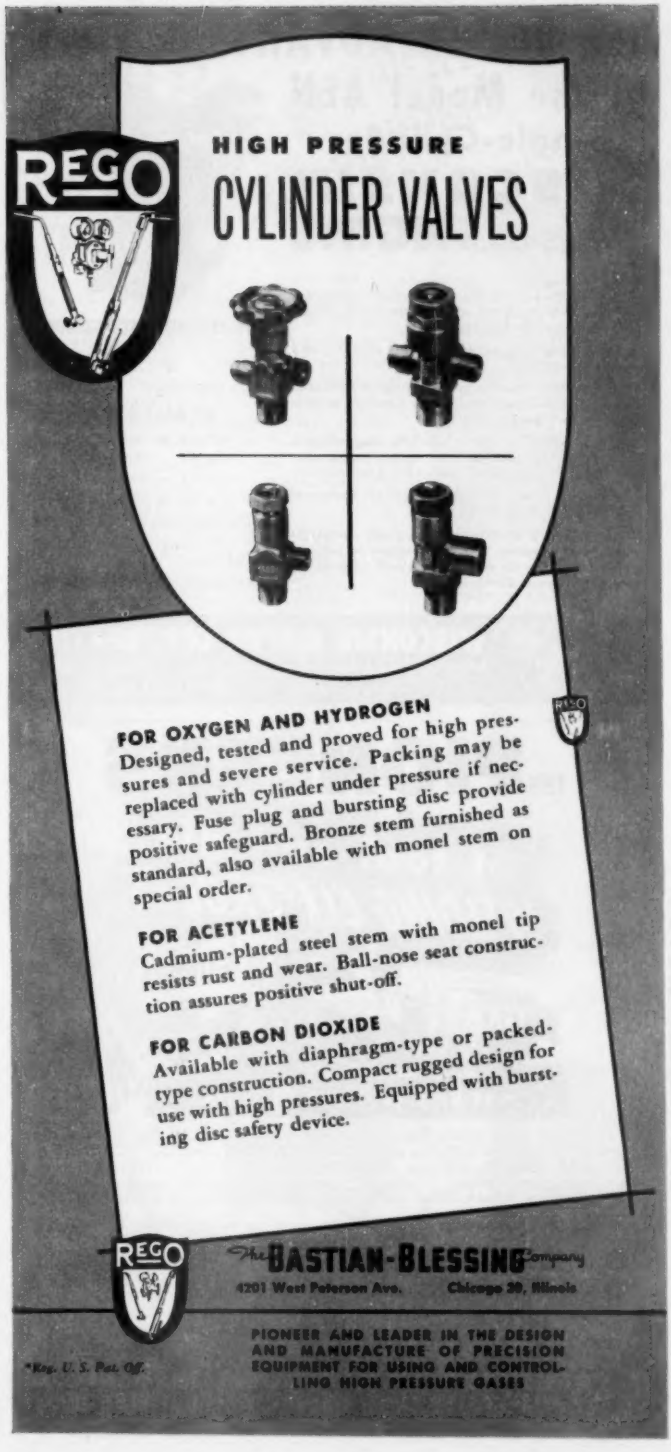
As evidence of what such studies may lead to in the welding field, cobalt-60, one of the new radioactive isotopes, is currently being used for radiographic inspection. (See THE WELDING ENGINEER, Sept., 1951, "New Methods for Non-Destructive Inspection."

* * *

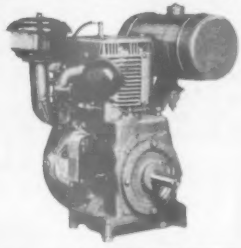
Rare Elements Help Make Better Steels

AN ELEMENT that helps to cure seasickness, two elements used in glassblowers' goggles and one employed to absorb gases in radio tubes are now serving in electric furnace steelmaking, according to the American Iron and Steel Institute. In the order referred to, these elements are cerium, neodymium, praseodymium and lanthanum, all members of the cerium group of the rare earth elements.

The four rare elements are metals, which form an alloy known as "mischmetall" (mixed metal). Its service to steelmaking is to help remove sulphur and gases from high-quality steels. The complex metal also helps to check the condition known as "bleeding," which sometimes occurs when a strong evolution of hydrogen or nitrogen ejects molten metal from the top of an ingot.


REGO
HIGH PRESSURE
CYLINDER VALVES
FOR OXYGEN AND HYDROGEN
Designed, tested and proved for high pressures and severe service. Packing may be replaced with cylinder under pressure if necessary. Fuse plug and bursting disc provide positive safeguard. Bronze stem furnished as standard, also available with monel stem on special order.
FOR ACETYLENE
Cadmium-plated steel stem with monel tip resists rust and wear. Ball-nose seat construction assures positive shut-off.
FOR CARBON DIOXIDE
Available with diaphragm-type or packed-type construction. Compact rugged design for use with high pressures. Equipped with bursting disc safety device.
REGO
The BASTIAN-BLESSING Company
4201 West Peterson Ave. Chicago 30, Illinois
PIONEER AND LEADER IN THE DESIGN AND MANUFACTURE OF PRECISION EQUIPMENT FOR USING AND CONTROLLING HIGH PRESSURE GASES
*Reg. U. S. Pat. Off.

The POWER ADVANTAGE Story of the Model AEN Single-Cylinder WISCONSIN Air-Cooled ENGINE



Here's more power . . . less weight . . . lower cost . . . all with no sacrifice in heavy-duty construction and serviceability in this Model AEN single-cylinder Wisconsin Engine. Features include:

1. Dependable air-cooling under all climatic and weather conditions.
2. Self-cleaning tapered roller bearings at both ends of the crankshaft withstand either side-pull or end-thrust without danger to bearings.
3. Rotary type high tension OUTSIDE Magneto with Impulse Coupling operates as an entirely independent unit that can be serviced or replaced in a few minutes.
4. Maximum torque at usable speeds for equipment that really has to go to work.

Our engineering department will gladly cooperate with you in adapting Wisconsin Engines to your requirements. Write for detailed data and name of the nearest Wisconsin distributor.

CONDENSED SPECIFICATIONS

Bore	3"
Stroke	3¼"
Piston Displacement	23 cu. in.

HORSEPOWER

5.1 H.P. at 1800 R.P.M.
6.4 H.P. at 2200 R.P.M.
7.2 H.P. at 2600 R.P.M.
7.5 H.P. at 3000 R.P.M.

	Net	Crated
No. of Piston Rings	4	
Fuel Tank Capacity	1.7 Gals	
Weight, lbs.		
Standard Engine	110 lbs.	135 lbs.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy Duty Air-Cooled Engines
MILWAUKEE 46 WISCONSIN

THE PIONEERS of tool and die WELDING ELECTRODES

. . . can help you save 4 ways

Save many man hours, conserve valuable tools and dies and minimize production delays with the aid of EUREKA TOOL and DIE WELDING ELECTRODES. Here's how it can be done:

1. REPAIRING DIES. . . . Exisiting units that may fail in operation can be EUREKA welded, either partially or wholly, resulting in a minimum of "down-time."
2. COMPOSITE FABRICATING. . . . Die units can be compositely fabricated, when practical, by EUREKA welding, resulting in numerous advantages.
3. CORRECTING DESIGN. . . . EUREKA welding facilitates making changes in contour, corners or edges during die "try-out" or "change-over" periods.
4. RECTIFYING ERRORS. . . . EUREKA welding permits the correction of errors made in tool and die manufacturing, resulting in great savings.

Welding Equipment & Supply Co.
PIONEERS IN TOOL AND DIE WELDING ELECTRODES
223 Leib Street • Detroit 7, Michigan

Welded Hatch Covers Withstand Rugged Treatment

NEW-TYPE aluminum hatch covers, fabricated by inert-gas-shielded metal-arc welding, have been accepted by the American Bureau of Shipping after going through slam-bang tests. They were loaded heavily, dropped on a concrete floor from considerable heights, hit with heavy weights and still came through in good shape. Welding equipment consisted of new gun-type automatic apparatus, says Linde Air Products Co.

Assembled from pieces of ¼-in. thick aluminum clamped in a jig, the required butt and fillet welds are made with the pistol-shaped welding gun. A 3/32-in. electrode wire was used as filler metal. Welding speed was 25 ipm, so that only about 15 minutes were required for the frame.

A groove along the top edges provides a seat for the top plate. Two holes are punched in this plate for cast aluminum handles. A continuous weld is made between the top plate and frame. On its underside, the top plate is skip welded to the frame.

• • •

Nation's Aluminum Oxide Capacity to Be Boosted

PLANS for increasing the country's alumina (aluminum oxide) producing capacity by 180,000 tons annually have been announced by Aluminum Ore Co., a subsidiary of Aluminum Company of America. Alumina is the material obtained from bauxite ore as the major preliminary step in the production of aluminum. About two pounds of alumina are used in producing one pound of aluminum.

New facilities will be added to an existing plant at Mobile, Alabama, and a new alumina works will be erected at Bauxite, Ark.

"I told you, Mamie! He had a reason for hiding his face!"

Weldor in Helicopter Plant Bends Pipe with Bare Hands

JOSEPH BAUER, foreman of the Hiller Helicopters welding department, San Diego, acts as his own bending machine. He can bend rods and pipes into a circle with his bare hands. The unusual strength that it takes to do this was developed in the course of a long boxing career.

During his Golden Gloves boxing days at Cleveland in the 1930's, Mr. Bauer fought Joe Louis on three different occasions before Louis turned professional. In 1934 he lost the national Golden Gloves light heavy title to Louis by a close decision of the judges. Mr. Bauer won the next year. in 1935, after Louis was a pro and out of the competition.

During the course of 250 amateur fights in the Golden Gloves, the welding foreman lost only eight bouts, three of them decisions to Louis. When his arm was injured in 1939 he quit boxing and turned to welding. his original occupation.

* * *

General Electric Repairs Flood-Damaged Apparatus

WITHIN three weeks of the peak of the Kansas City floods, more than 1,000 pieces of flooded electric apparatus had been returned to service after it had been reconditioned in the General Electric service shops there. Reconditioned equipment was turned out of two shops at the rate of about 100 pieces of apparatus per day. Equipment included motors of all sizes, transformers, circuit breakers and control devices. A 9,000 sq ft emergency shop, erected for the occasion, had a row of huge baking ovens, a large vacuum tank and other specialized equipment. G-E service engineers estimated that 90% of the flooded electrical equipment in the area could be salvaged.

* * *

Welding Helps Beef Get to Market

CATTLE at the Sioux City, Ia., stockyards get deluxe handling these days with new lightweight welded aluminum gates and ramps. The light metal makes the equipment easy to move and yet sturdy enough for long service under highly corrosive conditions, says Linde Air Products Co.

The portable aluminum cattle ramp shown above and numerous aluminum gates were inert-arc welded by the Pioneer Iron Works, of Sioux City.

miller

The STANDARD BY WHICH ALL OTHER WELDERS are JUDGED

For performance, ease of operation, maintenance cost and increased production MILLER Welders are the standard by which all others are judged. Their quality begins with the proper design by qualified and experienced engineers. They are made by skilled and experienced workmen in a modern plant . . . every welder is thoroughly and completely tested before leaving our factory to insure customer satisfaction, and the MILLER quality, that has been the same constant quality since 1929.

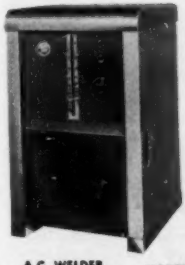
SELENIUM RECTIFIER TYPE D.C. ARC WELDER

AEA-200 AND AEA-200-L

ASK

Ask the MILLER distributor in your territory for a demonstration of MILLER Welders—or write us for complete details on the type welder you need in your plant.

A.C. ARC WELDERS FOR "HELIARC" WELDING



A.C. WELDER FOR SUBMERGED ARC WELDING

MODEL 100 SERIES INDUSTRIAL WELDER

10 KVA-20 KVA PORTABLE SPOT WELDERS

MODEL 88

ARC • SPOT WELDERS

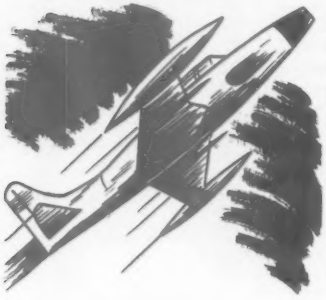
miller ELECTRIC MANUFACTURING CO.

SINCE 1929 APPLETON WISCONSIN

War materiel takes a lot of

ALL-STATE

No. 31 Sheet Aluminum Brazing Rod



THIS PROBLEM HAS ALREADY BEEN SOLVED: All-State No. 31 is particularly good on all thin aluminum sections (except 17ST and 24ST). Reasons are: Its working temperature (1050° F.) is well below the melting point of aluminum. There is no danger of burn-through on very thin material. No. 31 is corrosion-resistant, has good matching color, is as strong or stronger (30,000 p.s.i.) than the parent metal.

All this and application characteristics that makes weldor training quick and easy, have made All-State No. 31 Sheet Aluminum Brazing Rod mighty popular in defense work.

We've got time now for your problem: If you have a problem in your defense work, or if you manufacture such things as furniture, window sash, awnings and cooking utensils for which All-State No. 31 was particularly developed, our experience is readily available for you and we'll do our best to keep you going until there's enough No. 31 for everybody.

For Complete details ask for new All-State 32-page booklet. This is a Buyers Guide to the complete line of All-State Alloys and Fluxes for Welding, Brazing, Soldering, Tinning and Cutting.

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ALL-STATE

WELDING ALLOYS CO. INC.

White Plains, N. Y.

About People

DR. JAMES F. EVERSOLE has been appointed manager of research administration of Union Carbide and Carbon Corp. He will help to coördinate the research activities of all of the corporation laboratories where basic research and development work is being done on alloys, chemicals, gases, carbons and plastics. Until his present appointment, Dr. Eversole served as superintendent of the Linde Air Products Co. laboratories at Tonawanda, N. Y.

* * *

JEFF COATS has been appointed as sales personnel division manager of United States Steel Supply Co., Chicago. He was vice-president and general manager of Beaver Coaches, Inc., Beaver Falls, Pa., before he joined the sales personnel division of United States Steel Co. in May, 1950.

* * *

M. E. HOLMBERG, southwestern metallurgist, has opened consulting engineer offices in Bermac Building, 4101 San Jacinto, Houston. For the past 15 years, Holmberg has been associated with the Phillips Petroleum Co. at Bartlesville, Okla. Before going with Phillips Petroleum, he was with Black, Sivalls and Bryson, Inc., as metallurgical and welding engineer.

* * *

DR. G. R. RITTERER has been appointed dean of the schools of Engineering and Mines at the University of Pittsburg. He has been professor and head of the department of metallurgical engineering since 1939.

* * *

HERBERT G. WEIGHTMAN has been assigned to head the Progressive Welder Sales Co. of California. "Herb" has been active in industrial sales and services for the past four years on the west coast. His early experience included power transmission engineering with Boston Edison and with Consolidated Edison in New York. After four years of this, he moved on to special products development, processing and designing for production at Sylvania Electric and later to Stevens Arnold (high speed relays and control instruments). His new offices will be Brown Professional Building, 140 So. Glenoaks Boulevard, Burbank, Calif.

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● Looking for a connection that's easy to make as a Saturday night date . . . snug as a movie star's sweater . . . longer lasting than the pyramids? Get the facts on Cam-Lok Welding Cable Connectors: Made from solid brass, Cam-Lok's double-cam principle assures the most perfect contact possible. When connection is made it's vibration and weave-proof. There can be no arcing or burning. You get a perfect, low-resistance contact every time.

General Purpose and Heavy Duty Cam-Lok Cable Connectors and Terminal Lugs are completely interchangeable. You can couple and uncouple all cables and whip ends from No. 2 through 4/0 *without* adapters, quick as a wink. No other connector gives such complete versatility with trouble-free service.

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P.O. Box 98-B, Cincinnati 36, Ohio

G. F. VIETOR, JR., has been appointed a district manager of Air Reduction Magnolia Co., a division of Air Reduction Co., Inc. His headquarters will be in Houston and he will have responsibility over branch offices at San Antonio, Beaumont and Corpus Christi. He was assistant manager of the Boston district.

* * *

GEORGE C. MERCER has been appointed director of purchasing for P. R. Mallory & Co., Inc., Indianapolis. W. J. TOPMILLER, JR., former assistant purchasing agent, now becomes purchasing agent.

* * *

ROBERT S. BUBB has joined American Brake Shoe Company as marketing engineer. He will devote his time to studying the distribution methods of the company's 10 operating divisions.

* * *

ARTHUR HINES has been appointed assistant manager of marketing for the General Electric Co. His offices will be in New York. He was manager of the Michigan sales district of the company's apparatus line since 1949.

* * *

ROY L. CLARK has been named eastern Michigan sales representative of The McKay Co., Pittsburgh. His offices will be at 6432 Cass Ave., Detroit. He spent 13 years with Ford Motor Company in various departments and during the war supervised welding of hulls for M-4 and M-10 tanks. He has also been active in the American Welding Society's Detroit section and at present is assistant secretary. He has been in sales for six years previous to his present appointment with Welding Sales and Engineering Co.

* * *

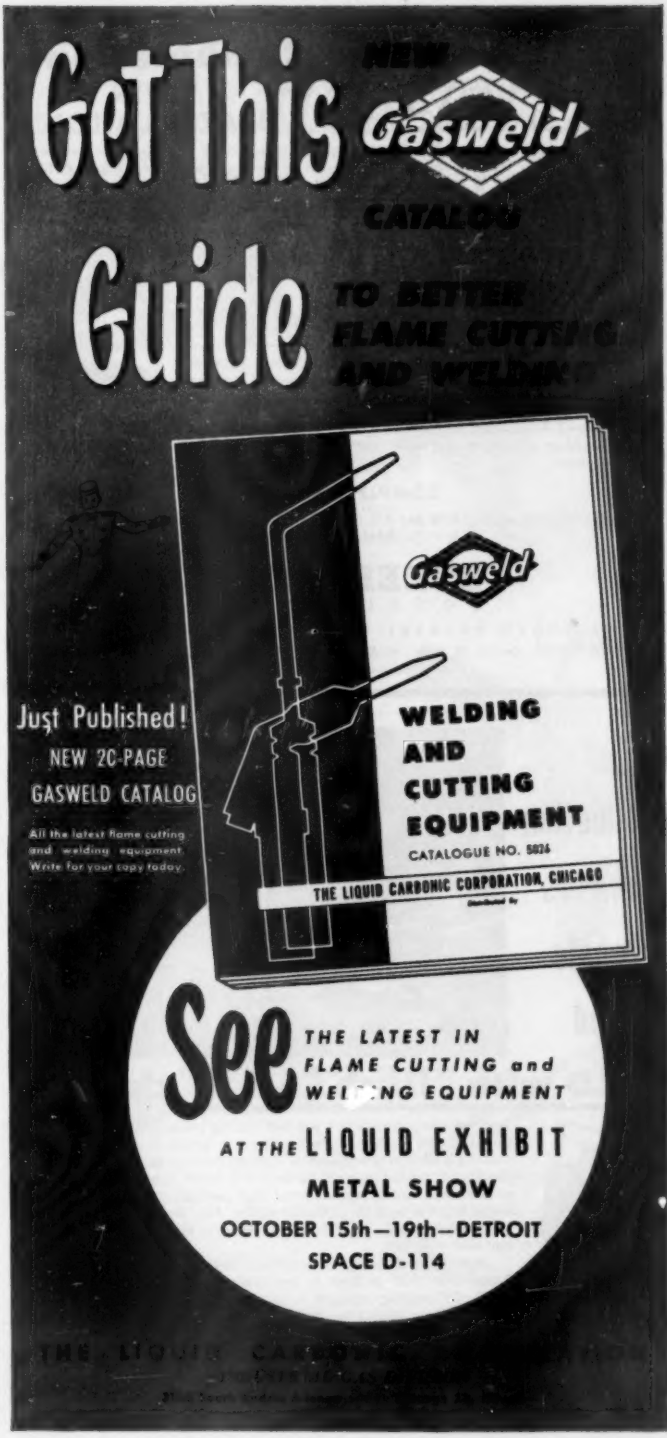
CLIFFORD M. DUNN has been appointed manager of General Electric's Michigan apparatus district. He replaces Arthur R. Hines who has become assistant manager of marketing for the company.

* * *

JOHN P. WRIGHT has been named factory manager of the durable goods operation of The Liquid Carbonic Corp., Chicago. He was formerly vice-president and general manager of the A. B. Dick Co.

* * *

H. W. MACARTHUR, general traffic manager of Air Reduction Co., Inc., retired on his normal retirement date of August 31, 1951. Mr. MacArthur had been general traffic manager of Air Reduction and of U. S. Industrial Chemicals, Inc., since 1939, when the traffic departments of the two companies were combined.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The Silvaloy group consists of 7 popular silver brazing alloys high in tensile strength and producing strong, ductile joints on ferrous and non-ferrous metals.

	SILVER CONTENT	MELTING POINT	FLOW POINT
SILVALOY 50	50%	1160 F	1175 F
SILVALOY 45	45%	1125 F	1145 F
SILVALOY 40	40%	1135 F	1205 F
SILVALOY 35	35%	1125 F	1295 F
SILVALOY 20	20%	1430 F	1500 F
SILVALOY 15	15%	1185 F	1280 F
SILVALOY 503	50%	1195 F	1270 F

1200 All-Purpose Flux—for use on all metals. No. 1200 Flux readily dissolves oxides during brazing operations and aids in the flowing of the alloy. Meets all government specifications.

1100 Low Temperature Flux—superior where exceptionally clean surfaces on copper or copper alloys are required at lower temperatures.

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More than forty "De-Sta-Co" models—including new portable and plunger clamps—offer quick solutions to your locating and holding problems. The "De-Sta-Co" stocking distributor in your area is qualified to assist you; call him in, or, if you haven't met him, write for his name and your copy of our catalog, today.

DETROIT STAMPING COMPANY

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J. F. JARMS is joining the C. B. Herrick Co., Cleveland, as assistant sales manager. For the past five years, Jarms has served Thompson Products, Inc., as welding engineer in its jet division. Prior to this experience, he headed welding sales and service for Williams & Co. in the Cleveland and Toledo territory. The C. B. Herrick Co. (Clayton B. Herrick, president) serves the metal-fabricating industry of northern Ohio as representative for equipment associated with welding and fabricating.

* * *

CHARLES C. BUCKLAND has been elected a vice-president of Minneapolis-Honeywell Regulator Co. He will head a newly created sub-contracting division that will correlate and expand sub-contracting activities of the aeronautical and ordnance defense programs.

* * *

GLENN SEIDEL, who has been assistant to the vice-president in charge of engineering, Minneapolis-Honeywell has been appointed to the newly created post of director of ordnance. Another new post—superintendent of ordnance—will be filled by STANLEY J. NELSON, superintendent of manufacturing. HOWARD J. STOOPS, formerly manager of administration, has been appointed director of manufacturing.

* * *

J. L. SINGLETON, vice-president in charge of the general machinery division and R. S. STEVENSON, vice-president in charge of the tractor division have been elected to the board of directors of Allis-Chalmers Mfg. Co. They succeed as directors the late Walter Geist and W. C. Johnson. W. E. HAWKINSON, secretary and treasurer of the company, was named vice-president in addition to his other posts.

* * *

H. STANLEY BIMPSON has been named to the office of the director of engineering of Allis-Chalmers Mfg. Company's general machinery division as consulting engineer.

* * *

LUCIO F. MONDOLFO, associate professor of metallurgical engineering at Illinois Institute of Technology, Chicago, has been promoted to professor.

* * *

H. G. MCILVRIED, a former Chicagoan, retired on Aug. 31 as superintendent of United States Steel Company's Homestead district works in Munhall, Pa., after more than 50 years of service with U. S. Steel. He is succeeded by JOHN A. HAGEN, assistant general superintendent of the Youngstown, O., district works.

30 YEARS AGO

(From THE WELDING ENGINEER of Oct., 1921)

OXYACETYLENE welding of aluminum alloys is fairly easy if a welding wire of the same alloy is used with a good aluminum flux. If the welded portion is submitted to a bending test, failure of the joint occurs because there is no ductility in the weld zone. Therefore, welded aluminum should not be used if the parts are liable to be bent or subject to shock loads.

— 30 YEARS AGO —

DETROIT street railways have been considerably expanded since last spring with the addition of several miles of arc welded rails and rail bonds. Twelve two-electrode welders of 300 amp capacity and two resistance welders are being used. Complete details of the joints, rail temperature tests and special bonds are included in this issue of THE WELDING ENGINEER.

— 30 YEARS AGO —

FIRST all-welded locomotive tender water tank has been in service on the Boston & Albany Railroad about six months. The tank holds 8,000 gal and required 1,200 linear feet of arc welded seams to join the ¼-in. plates. Welding of such tanks eliminates all rivet holes and cuts down to a minimum the likelihood of leaks.

— 30 YEARS AGO —

MONEL metal welding procedures are explained by Michael Dzamba of the technical department of The International Nickel Company in an article in THE WELDING ENGINEER this month. So far oxyacetylene welding is best for Monel, because arc welding hasn't been perfected for this metal.

— 30 YEARS AGO —

STULZ-SICKLES CO., Newark, N. J. recently became the sole distributors in the United States and Canada for the "Seaco" line of tool steel and welding wire.

— 30 YEARS AGO —

A COOPERATIVE company has been formed in New York City to aid job shop weldors in improving and expanding their businesses. Called The Welding Promotion Company, it will deal solely with the welding business and various aspects of related publicity and advertising.

— 30 YEARS AGO —

AN EXPENSIVE die owned by a Chicago manufacturer was recently repaired by oxyacetylene welding. Made of cast iron, the die was used to form babbitt metal products. Filler rod used was high grade cast iron.

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BERNARD WELDING PRODUCTS

"Shortstub" ELECTRODE HOLDERS

Request 16-page Booklet FORM SS-3

The jaws substitute for stub waste by splicing a 2 inch extension to the length of every electrode.

—The total fluxed portion of every electrode is converted into weld metal.

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MODERNIZE the fabrication of plates, shapes, rods, bars, pipes, etc. MAKE fitting, positioning, holding, and welding a fast, accurate, inexpensive, one-man job.

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"Multi-Pic" WELD CLEANING HAMMERS

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Delivers FIVE surface cleaning blows with each swing and lasts FIVE times longer than single headed hammers.

HAS 5 CONTOUR FORMING HEADS WHICH MEANS 5 TIMES FASTER CLEANING ACTION.

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Every requirement for faster, better positioned welding — constant or variable speed table rotation, full 135° tilt, self-locking gearing which holds the table in any position, oversize built-in main tilt and rotating bearings, choice of two base styles, and many other features — are built into C-F Positioners.
C-F Positioners are available in Hand or Power operated models, and are made in capacities up to 30,000 lbs. and larger.
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C-F positioned welds mean better, more economical welds

Book Reviews

Welding

WELDING PRINCIPLES FOR ENGINEERS. By J. L. Morris. Published by Prentice-Hall, Inc., New York, 1951. Cloth, 5½ x 8½ in., 511 pages. Price $7.

In *Welding Principles for Engineers*, the author has sought to organize in one volume the welding material appropriate for welding training on a college level. He has touched on many subjects of interest in the welding field: welding metallurgy; survey of welding processes, characteristics and applications; testing of welds; welding of commercial metals; braze welding; brazing and soldering; surfacing and metal-spraying; filler materials; flame heat-treatment; oxygen cutting; stresses and distortions; design for welding and factors effecting welding production economy.

No welding laboratory exercises are included. It is the feeling of this author that such exercises are an important part of the engineering student's curriculum but that a confident instructor can do better by organizing his own laboratory problems than by copying set exercises.

Mr. Morris has made an excellent attempt to present the welding needs of an negineering student in a single volume. Because of the wide range of material to be covered, however, the question arises as to whether or not the attempt has been successful. Possibly a more satisfactory volume would have resulted had the scope of the book been less broad and some of the subjects treated in greater detail.

* * *

Electricity

PRACTICAL ELECTRICITY AND MAGNETISM. By Maurice Rubin. Published by Chemical Publishing Co., Inc., New York, 1951. Cloth, 5½ x 8½ in., 356 pages. Price $7.50.

Mr. Rubin's book is suitable for the layman who is interested in electricity and magnetism or for the engineer who has been too busy to keep abreast with recent developments. He discusses over 404 topics, beginning with electrostatics and progressing to electrical charges in motion, electrical meters, measurements, magnetism, electronics and the electrical conductivity of gases. Practical applications to communication, radar and other recent developments are included.

The material is presented with a simplicity and clarity that will make it fully readable regardless of whether the reader has or has not a technical background. Mr. Rubin is to be commended for his effort to make learning about the prime movers of our age so painless.

Pipe Welding

STANDARD MANUAL ON PIPE WELDING, 2nd Edition. Published by Heating, Piping and Air Conditioning Contractors National Association, New York, 1951. Cloth, 6 x 9 in., 506 pages. Price $7.50.

The Heating, Piping and Air Conditioning Contractors National Association has published the second edition of *Standard Manual on Pipe Welding* and thereby fulfilled a great need in the welding field. The original edition, published in 1931, was badly outdated.

The new volume has been completely rewritten. While primarily directed to the piping contractor, the manual also fills the needs of architects, engineers and others who are looking for up-to-date and authoritative treatment of design and installation practices for welded piping systems.

The first three chapters describe welding processes and welding equipment maintenance. The next five chapters are devoted to specific problems—selection and training of operators, scope of pipe welding materials and filler metals, testing and inspection, code welding procedures and specifications. Contractor, engineer and architect are then given useful pointers in several chapters discussing templates and jigs, layout and fabrication details, estimating welding costs, coördinating facilities, organizing a fabrication shop and a field-welding set-up.

The following chapters discuss the welding of various materials that are used in piping, while the final chapter contains 44 pages of engineering data and tables.

* * *

Writing

CLEAR WRITING FOR EASY READING. By Norman G. Shidle. Published by McGraw-Hill Book Co., Inc., New York, 1951. Cloth, 5½ x 8 in., 176 pages. Price $3.

"Say it quickly and say it simply" might be a concise review of this book. *Clear Writing for Easy Reading* is simply written, well organized and comprehensive. It describes and teaches the application of a specific method for writing reports, letters, memoranda, articles and other kinds of writing in which attempt is made to explain, sell or influence readers.

A good share of the author's attention has been concentrated on everyday writing jobs, such as those daily confronting the businessman or the engineer. There are many practical exercises and examples of good and poor writing included.

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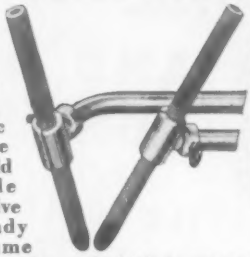
KEEN-ARC CARBONS



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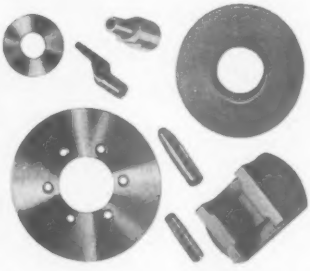
Resistance Welding Alloys



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- In the following classes: Copper Base Alloys in the commonly used classes 1, 2, and 3, as well as 4 and 5 for special purposes, and the Copper Tungsten Alloys.

Welding Sales & Engineering Co., 8750 Grinnell, Detroit 13

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MACHINERY & WELDER CORP., St. Louis, Minneapolis; WELDING ENGINEERING & EQUIPMENT CO., Syracuse, N. Y.; WELDING EQUIPMENT SALES CO., Buffalo, N. Y.; WELDING SALES CO., Newark, N. J.; GENERAL ELECTRIC WELDING DIVISION, Boston, Mass.; MILLER WELDING SUPPLY, Grand Rapids, Mich.; C. E. SMITH, Warren, Ohio; UPTON BRADEEN & JAMES, LTD., Montreal; CURTIS-WELLS CO., Toronto, Ont.

From the Patent Office

Acetylene Manifold

2,563,989. JOHN J. CROWE, Westfield, N. J. Assigned to Air Reduction Co., Inc., Filed Aug. 17, 1945. Granted Aug. 14, 1951.

Patent refers to a manifold for connecting a gas service line with a number of cylinders containing acetylene under pressure. There is an outlet for the acetylene and a plurality of inlets each of which is spaced from the outlet longitudinally of the manifold. A number of open-end tubes are positioned in the manifold and extend along it. Each of the tubes has spaced openings in its walls. All of the tubes are held in laterally spaced relations and arranged in a single series transversely of the manifold. The series of tubes has the shape of a helicoid.

* * *

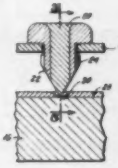
Wrench Jaws

2,563,267. CHRISTIAN PETERSEN, De Witt, Nebr. Assigned to Petersen Mfg. Co., Inc., De Witt, Nebr. Filed Nov. 12, 1947. Granted Aug. 7, 1951.

Patent covers a wrench having pivoted jaws. The opposing toothed, gripping jaw faces have an involute curvature extending from the outer end of the jaw inwardly through a portion of the length. A relatively long outwardly bowed portion continues in a flat curve from the inner end of the involute curve. The involute curves present opposing convex working portions. They approach a condition of straightness at their outer ends which are convergent when the jaws are brought together. Each of the jaw faces at the converging ends is knurled for a part of its length. The remaining part of each jaw face has the abovementioned gripping teeth across it.

New Welded Connection

2,563,107. HERMAN J. FANGER, Los Gatos, Calif. Filed Nov. 30, 1949. Granted Aug. 7, 1951.



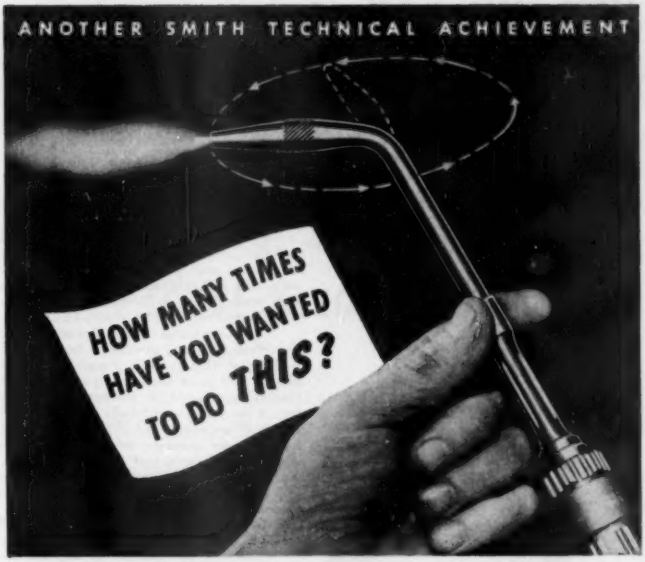
A newly patented method of attachment concerns the securing of one member with a hole through it to a second metallic surface. The attachment is a rivet with a head of larger diameter than the hole in the first member. It is made of a metal of high electrical conductivity. Permanently secured at the end of the shank of the rivet is a shell of metal of low thermal conductivity. The shell is fusible by means of resistance welding to the metallic surface. The method consists of inserting the rivet shank-wise through the hole of the first member into engagement with the metallic surface of the second member. A resistance welding electrode is applied to the head of the rivet. A current of sufficient magnitude to fuse the shell metal is then passed through the rivet to make the attachment.

* * *

Flash Welder

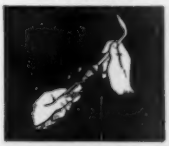
2,566,670. ALFRED H. LEWIS, Huntington Woods, Mich. Assigned to Swift Electric Welder Co. Filed Jan. 26, 1950. Granted Sept. 4, 1951.

A newly patented flash welder has a base, a fixed platen and a movable platen on the base. Hydraulic operating mechanisms include a number of cam-operated hydraulic controls for moving the movable platen at various speeds toward and away from the fixed platen. Each platen includes an electrode and means for clamping work to it. For initiating one of the cam-operated controls that move the movable platen toward the fixed one, there is a manually operated cam. Other cams that are movable with the movable platen initiate other cam-operated controls to successively increase its speed. A stop limits the movement of the movable platen toward the fixed platen. There are also means for cutting off the welding current prior to completion of the movement. The manually movable cam means also initiates other cam-operated controls that will reverse the movement of the platen at any time during and after the completion of the forward movement.



Rotate Tip in any direction *even while flame is burning!*

PLUS THESE EXTRA ADVANTAGES



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No wrench needed. Fingers do the job. Just insert new tip—spin nut down — that's all.

GUARANTEED service for the rest of your life on all Smith's "LIFELONG" welding torch bodies and cutting assemblies.

THINK what this means in speeding up production schedules and reducing operator fatigue! The average welder is on a stop-and-go basis most of the day — shifting to new positions or stopping to adjust his work — and thus losing production time.

This new Smith Equipment makes it possible to work in the most comfortable and convenient position because the tip can be turned in any direction even while flame is burning. No time out to shut off flame, adjust tip angle or move your work. Just a twist of the finger, or a tap on the side of the tip does the job. It's a time-saver to help you increase production per man-hour and meet production schedules.

NOTE: This feature plus high speed change of tips (in 6 seconds — no wrench needed) is available in the following Smith equipment: Smith's "LIFELONG," MIDLINE and AIRLINE Torches.

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Your present rocker arm spot welders can *really* produce *extra* profits—for all it takes is the simple installation of a compact Weld-Air-Matic. This self-contained control unit *air-powers* your welder—adds *speed, accuracy, ease of operation* never before possible with your present foot-operated welder.

Tests Prove 10,000 Welds Hourly on Continuous Daily Schedules

The Weld-Air-Matic provides a feather-touch foot switch that controls pressure and energizes a coil on a four-way operating valve. Employing reduced air pressure of 15 to 50 lbs., it has a maximum stroke of 1½" on size 1 unit, 2" on size 2, and 2½" on size 3 unit. Requires any standard Weld Timer and a minimum of 4 cubic feet air supply per minute, with 80 lbs. minimum line pressure. Three sizes available with all accessories mounted to one strong aluminum alloy casting.

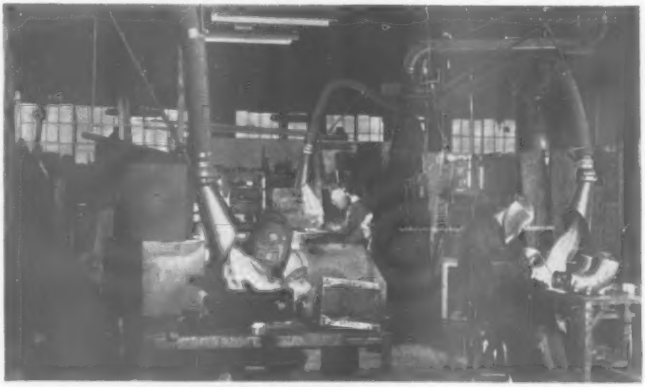
Get the facts now on how you can break all previous production records of your present equipment, by modernizing with the new Weld-Air-Matic. You can't lose — for the savings you make will quickly account for Weld-Air-Matic's nominal cost.

DEALER TERRITORIES AVAILABLE—
Information on Request

WRITE TODAY FOR DETAILS

ROBT. W. HOFFMAN COMPANY, INC.

40 South Clinton Street **Chicago 6, Illinois**



Group of RUEMELIN Fume Collectors Keeps Shop Clear of Welding Fumes

This well ventilated welding department is typical of hundreds of similar installations. Welding operators appreciate smoke and gas-free atmosphere. Thousands in service. Many repeat orders. Collecting fumes at the source with local exhaust hoods has proven most practical in operation. Write for Bulletin 37-D describing all types of Ruemelin Fume Collectors.

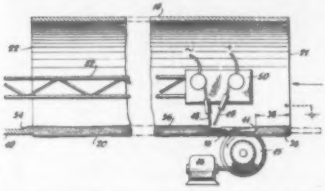
RUEMELIN MFG. CO.

MFRS. & ENGRS. • SAND BLAST & DUST COLLECTING EQUIPMENT
3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

A 5911-½

Welded Pipe Manufacture

2,564,396. FREDERIC M. DARNER, Shaker Heights, O. Assigned to Republic Steel Corp., Cleveland. Filed Nov. 1, 1949. Granted Aug. 14, 1951.



Patent refers to a method of joining a longitudinal seam in a pipe blank of large diameter. The seam is first welded on the outside surface between the ends of the blank. On the inside surface the seam is tack welded at one end but completed by welding thereafter from the opposite end. The first inside welding operation comprises holding a metal member against the edge of the first end of the blank in bridging relation to the seam. One surface of the member is aligned with the surface to be welded. While this member is held, welding is carried on progressively along a line that extends between the first end and a point a short distance from it (the length of the tack). The second inside welding operation comprises advancing a number of welding arcs in close tandem relation progressively along the seam from the opposite end of the blank to the tacked portion.

* * *

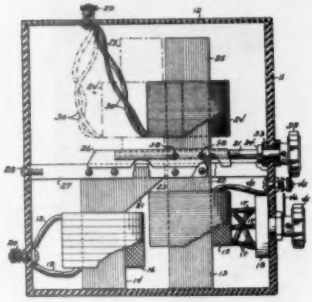
Welded Expansible Bellows

2,565,296. JOHN J. CHYLE, Wauwatosa, Wis. Assigned to A. O. Smith Corp., Milwaukee. Filed Feb. 12, 1945. Granted Aug. 21, 1951.

Patent covers a welded disc type expansible bellows. The bellows is made from a pair of complementary discs with dished bodies with an opening through the centers of each. The discs are placed to provide an acute angle between them in radial section with the apex next to the meeting edges of the discs. A fusion welded joinder of the meeting edges extends circumferentially of the discs. It has spacer metal incorporated at the root of the joint and disposed within the angle of the adjacent faces of the discs. The spacer metal protects the fusion welded joint against extension of any incipient crack in it.

Welder Voltage Control

2,565,181. Lewis S. Mansperger, Independence, Mo. Filed Oct. 6, 1947. Granted Aug. 21, 1951.



Patent covers a welder for alternating current welding that consists of a single primary core and a pair of secondary core assemblies. The primary coil is movable with respect to the two secondaries and can be magnetically coupled to either or both of them. The degree of coupling is determined by the position of the primary with the secondaries. A shoulder extends from one of the secondaries into close proximity with the other where it is adapted to be magnetically coupled to the primary. A threaded rod and knob are provided to move the primary. A tapped secondary winding surrounds a part of one of the secondaries. A number of taps are mounted on this winding. A hand-operated selector switch renders one of the taps effective for utilizing a portion of the winding. A handle on the housing actuates the selector switch. A pointer acts with the handle.

* * *

Stainless Electrode and Coating

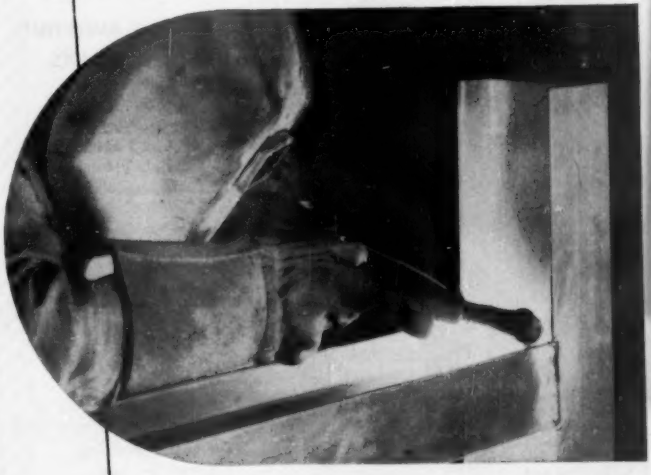
2,564,474. Alexander L. Feild, Baltimore, Md. Assigned to Armco Steel Corp. Filed Jan. 21, 1948. Granted Aug. 14, 1951.

Newly patented electrode for stainless steel welding has a core of extra low carbon content. The core contains about 0.03% max. carbon, about 21% chromium, about 10% nickel, about 1.5% manganese with the remainder substantially all iron. The electrode coating contains columbium ore having a carbon content not exceeding 0.03%, crushed ferro-silicon relieved of fines and having an extremely low carbon content and being in amount in excess of that necessary to reduce the ore. The coating also contains a flux of limestone and fluorspar in major amount and asbestos in minor amount and a sodium silicate binder.

DEFENSE CONTRACTORS

building aluminum structures
should have the help of their . . .
LOCAL ALCOA DISTRIBUTORS

He makes available to you Alcoa's authoritative technical library . . . 4 specialized training films on aluminum welding, plus a profusely illustrated 135-page welding handbook. You'll find your Alcoa Distributor listed under "aluminum" in your classified phone book. Or write to Aluminum Company of America, 1943K Gulf Bldg., Pittsburgh 19, Pennsylvania.



Dependable welds are quickly and economically made on aluminum structural members. Ask your Alcoa Distributor.

ALCOA FIRST IN ALUMINUM

ACCURATE PRECISION WELDING

MADE EASY...

AVIATOR-JET TORCH

1. PERMANENT ACCURACY OF FLAME. Assured by spring tension control valves.

2. Armored attachment gasket between mixer and torch handle. Minimizes wear.

3. PRECISE GAS MIXTURE. No need to change mixture to fit tip size.

4. LIGHT WEIGHT alloy handle. Weight reduced. Less fatigue, longer production periods.

RUGGED • LIGHT • EASY TO USE

Here's the perfect double duty torch wherever sheet metal is welded. Uses either oxygen, acetylene, or oxygen and hydrogen. Designed for automobile body shops, refrigeration servicemen, electric manufacturers, and other sheet metal welders.

Ask your dealer to show you the AVIATOR-JET Cutting Attachment too! Cuts up to one inch.

Meco

Modern Engineering CO., Inc.

3411 PINE BLVD. ST. LOUIS 3, MO.

SPECIAL GLOVE DEVELOPMENT BY RACINE

THREE STYLES

- 380 Horsehide
- 384 Pearl Carpincho (wildpig)
- 386 Cowhide

Chrome tanned Heat Resistant Split Leather—Heat Breaker Back Lining—LARGE size—

1. One piece back.
2. One piece palm.
3. Thumb seam protected by wide leather strap.
4. All vulnerable seams welted.
5. Palm side of thumb is protected by extra leather overlay.

• Send for booklet on these and other GARDSMEN Protective Equipment.

RACINE GLOVE COMPANY, INC.

RIO, WISCONSIN

W-AL-CO RODS

for Welding of ALUMINUM

ELECTRIC AND GAS WELDING

Drawn Wire

TYPES 25, 43 and 52

Brazing 716

FOR CAST ALUMINUM

Use Extruded Rods

Types 142, 195, 355 and 356

for Better Welding

3/16" size only

Aluminum Solder

White Metal

Welding Alloys Manufacturing Co.

744 Broad St. Newark 2, N. J.

NEW PRODUCTS

(Continued from page 63)

Airco Brings out New 200-Amp Welder

AIRCO Model MCM 200-amp transformer welder is designed for general maintenance and production welding. Rating is a full 200 amp at 50% duty cycle, NEMA rating. Four variations are available—220 volt or a 220/440/550 volt unit, each with or without power-factor correction.

Two open-circuit voltages are provided: 80 volts on the low range and 55 volts on the high range. Other features are: easy-to-read current indicator, complete insulation and no moving parts.

AIR REDUCTION SALES CO., 60 East 42nd St., New York City 17.

* * *

Cartridge Respirator For Fume Protection

THE NEW "800" series of chemical cartridge respirators made by Willson includes styles for protection against low concentrations of metal fumes, mists and dusts as well as industrial gases. Three cartridge sizes can be used: 60, 85 and 100 cc.

The newly designed facepiece has feathered rolled edges for a snug, comfortable fit. The exhalation valve is positioned to minimize possibility of dust interfering.

WILLSON PRODUCTS, INC., Reading, Pa.

Special Tempil Paints Indicate Temperatures

NEW DEVELOPMENTS in the temperature-indicating line to be shown at the Metal Show include "Pyromark" and "Temp-Alarm." "Pyromark" is a high-temperature paint; some compounds of it are able to withstand temperatures as high as 2,500 F.

"Temp-Alarm" temperature-indicating paint has the adhesion and durability of good standard paint, but exhibits a dramatic color change at various predetermined temperatures.

Series "R" Tempil pellets in an enlarged range of temperature ratings will also be on display at the Metal Show. They are for use under strongly reducing conditions such as in the new brazing furnaces.

TEMPIL CORP., 132 West 22nd St., New York City 11.

* * *

New Aronson Positioner Features Speed, Precision

MODEL 14UGD "Universal Gear-Driven" positioner achieves new marks in precision rotation and fast positioning, according to its manufacturer. Backlash is practically eliminated, with an inspection maximum limit of 1/64 in. at 12-in. radius. The gear teeth are precision machined, and worm drives are used immediately motorward of final drives to reduce further backlash accumulation.

Trunnion and main spindle are fitted with Timken bearings. There is a sealed pool of mercury surrounding both the main spindle and trunnion shaft to provide good ground as well as a gasproof and heatproof seal.

Tilting speed is 135 deg in 22½ seconds. The table rotates a constant speed of 4 rpm or at selected variable speeds between 0 and 2.73 rpm. The rotating mechanism can be connected to the welder so that both can be started and stopped at selected time cycles. This positioner can be seen at the Metal Show in Detroit this month.

ARONSON MACHINE CO., Arcade, N. Y.

United WIRE
BRAZING RINGS
SAVE 6 WAYS

LOW COST UNITED WIRE BRAZING RINGS of the exact size and weight most economical for every job will simplify low temperature brazing. Place at . . . or within . . . the joint and simply heat to brazing temperature.

ORDER UNITED WIRE'S SIL-BOND silver brazing alloys for brazing the steels, the irons and nickel alloys. Order the newly developed lower cost PHOSON and PHOSCO alloys for brazing the Coppers, Bronzes and Brasses.

(1) Speeds production. Operator simply heats joint. Can do so more uniformly in less time.

(2) Improves quality. Ring is excellent temperature guide. Discourages over and underheating.

(3) Reduces Rejections. Assures sufficient brazing alloy. If good braze isn't being made, alloy won't flow.

(4) Improves neatness. Eliminates overruns and costly brazing variables. Less cleaning after brazing.

(5) Eliminates costly wastes of Brazing Alloy. Saves time and fuel costs, too.

(6) Assists operator by simplifying brazing. Aids in inspection.

BULLETIN 37 TELLS YOU MORE
FREE

AT YOUR WELDING SUPPLY JOBBER
OR WRITE US

UNITED WIRE & SUPPLY CORP.
PROVIDENCE 7- RHODE ISLAND

HOBART electrodes

...there's one for every purpose

One type of machine can't handle all jobs . . . and neither can one type of electrode. That's why Hobart offers you a complete line—a line that gives you a practical solution to every welding problem.

All Hobart Electrodes are products of precision manufacturing and all are rigidly inspected to assure uniform high quality. They are always the same . . . and always give you better, faster welds at lower cost.

Our new electrode catalog tells the complete story of each and every Hobart Electrode—identification, application, procedure, physical properties, and recommended currents. In addition, it gives valuable tips on selecting the right electrode—tells how to solve common welding problems. You'll want this valuable book for day-to-day reference, so write us today for your free copy. If you have a welding problem, tell us about that, too. We'll recommend the proper electrode and send you free samples to try on the job.

HOBART BROTHERS COMPANY

Box U-1011, Troy, Ohio

"One of the world's largest builders of arc welders"

Air Hammer for Medium to Heavy-Duty Tasks

MODEL G-200 air hammer, a light hand tool weighing just slightly over two pounds, works at a pressure of 120 psi to strike up to 6,000 blows per minute with maximum force. It may be metered to a lower speed or striking power by a simple finger trigger action. Newly patented three-point ball-bearing chuck locks tools in working position, eliminating the hazard of tool ejection. Driving piston constitutes the only moving part.

Sixty-six different tools are regularly available for use with the G-200 hammer, and specialized tool kits are offered for various types of duties such as weld clean-up, maintenance, foundry work, motor block repair, body construction, marine scaling, caulking, etc. Blanks may also be purchased to make individual tools to do specialized tasks.

SALSBURY CORP., 1161 East Florence Ave., Los Angeles 1.

* * *

Hard-Facing Electrode For Carbon Steel

TO PROTECT carbon and alloy steel surfaces subjected to severe abrasive wear and comparatively mild impact, new "EuteChrom 2X" a-c/d-c electrodes are said to put down a strong, dense deposit at lower cost. Lower amperages can also be used, which minimizes danger of distortion and locked-in stresses.

EUTECTIC WELDING ALLOYS CORP., Dept. P, 172nd St. & Northern Blvd., Flushing 58, N. Y.

* * *

Lead-Free Aluminum Rod Melts at 400 F

ORDINARY soldering irons can be used to apply the new No. 37 lead-free aluminum solder rod, which melts at 400 F and flows at 450 F. It is used with All-State No. 37 "Brazaloy" flux to solder all aluminum alloys except 24ST. Some applications are: electric and neon signs, television and radio chassis, electronic equipment. The rod comes in 1/8 by 18-in. and 1/4 by 14-in. sizes in 5-lb packages. M-8 and M-19 certifications are required.

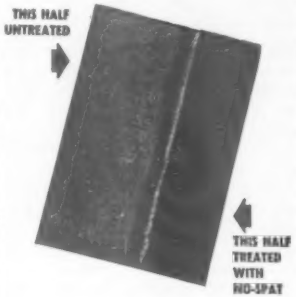
ALL STATE WELDING ALLOYS CO., INC., White Plains, N. Y.

SAVES TIME
SAVES LABOR
SAVES MONEY

NO-SPAT

THE NON-TOXIC WELDING FLUID

NO-SPAT eliminates slow, costly cleaning. Keeps adjoining surface spatter-free. Prevents rust, keeps welding jigs clean. No carbon monoxide. Send for FREE sample.



The Midland Paint & Varnish Co.

3803 E. 91st St. • Cleveland, Ohio

"Red Head"

WELDING CLAMPS

• Designed for Welding •

Made to take abuse

1. Case Hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

2. The clamp body is cut from solid plate and heat treated to give greater resistance to bending and twisting.

3. Heat treated chrome molybdenum alloy handle offers great resistance to bending.

23 stock sizes

CHICAGO BOILER COMPANY

1969 CLYBOURN AVENUE

CHICAGO 14, ILLINOIS

Mechanical Loader for Furnace Charging

A NEW mechanical furnace loader, especially designed to speed up heat treating, eliminates single-piece handling and does away with tongs, gloves and sweat in furnace loading and unloading.

The work is placed on the frame of the loader (which will handle several layers of work at a time), and the entire load is then picked up and inserted into the furnace by fork bars. Unloading is accomplished as simply by inserting the fork bars and withdrawing the whole load. The loader is then wheeled to the quench tank (or next operation), where its contents are released hydraulically. While he charges or unloads the furnace, the operator is protected from heat by a built-in metal shield.

The "Contro-Therm" fork lift loader can also be used around the plant as a hydraulically operated lift truck for carrying and lifting jigs, tools, dies, light work and the like. Its four swivel castors allow easy, smooth rolling.

A. D. ALPINE, INC., 11837 Teale St., Culver City, Calif.

* * *

Wear This Glove on Either Hand

HERE'S something really neat—a glove that can be worn on either the right or the left hand. It's not an impossibility if the glove is turned inside out—try it on one of your own gloves and see. This plastic-coated glove is reversible, enabling it to be worn on either hand. Three styles are offered: No. 600, with knit wrist; No. 700, a short gauntlet; and No. 800, a full gauntlet. A soft, fleecy lining is provided that is reversible with the glove.

Because of the reversible feature, the "wear-out" points of most gloves are done away with, says the manufacturer. The plastic coating material is declared to be resistant to acid flame, chemicals and abrasives.

WASHINGTON GLOVE CORP., 106 N. Water St., Milwaukee 2.

Finest for Every Requirement...

Mid-States

AC ARC WELDERS

Model 300-U
10-300 Amps

HEAVY-DUTY

METAL ZIPPER

A complete welding outfit for every welding need . . . unequalled for all-around performance and efficiency . . . welds all metals, ferrous and non-ferrous, heavy, medium and light, even 22 gauge . . . does brazing, soldering, hard-surfacing and heating with ease . . . shown equipped with "Missing Link" automatic arc stabilizer for peak performance in AC welding . . . uses any type welding rod . . . even beginners do excellent work.

PORTABLE

JUNIOR

A small size, economical model for general use on construction job, production line, repair shop, factory or farm . . . has same rugged construction and superior transformer features of larger Mid-States welders . . . will meet the most exacting performance demands.

9000 ARC TORCH

Versatile torch to assure sound welds on all metals—ferrous and non-ferrous; permits brazing, soldering, hard-surfacing, heating, straightening and bending. For use with any AC or DC electric welder.

ZIP

SPOT WELDER

For 1001 jobs in shops . . . welds to ⅛" thickness of metal. Exclusive patented features include: fixed tap tong, assorted lengths and shapes of tongs, adjustable curved tips and welding points for "hard-to-reach" spots; fully portable; easy to handle; ruggedly built; perfectly balanced; requires only one hand to operate. For 110 or 220 volts.

MISSING LINK

High Frequency Arc Stabilizer

For all welders, AC or DC—the "Missing Link" that permits inert gas shielded welding; eliminates pecking and scratching; starts arc automatically; permits the use of any type welding rod, AC or DC; simplifies all jobs; easily attached to any welder; models for 0-300 amp. and 0-600 amp. welders.

EVERY MID-STATES WELDER is engineered and constructed for finest performance over the years. Whatever you need for top-quality, economical welding you can depend on Mid-States. Ask for descriptive literature on the complete line.

MID-STATES WELDER MFG. CO.

6023 SO. ASHLAND AVE. • CHICAGO 36, ILLINOIS

A CABLE WELDED IN 10 SECONDS BY CADWELD

The Cadweld Process, an outstanding method of splicing welding cable — no skill required. Salvage short lengths of cable. Powdered copper oxide and aluminum are dumped into a graphite crucible and ignited with a flint gun. The molten copper obtained from the reaction welds the cable ends together.

Connection has: No overloading, loosening or oxidation. Current carrying capacity of the weld is greater than the cable itself. Time required — less than one minute.

Welder M-364 — for No. 1 and No. 2 cable
Welder M-263 — for 1/0 and 2/0 cable
Welder M-262 — for 3/0 and 4/0 cable

For the best in lugs, quick connectors, ground clamps, and electrode holders, buy Caddy — Bulletins on request.

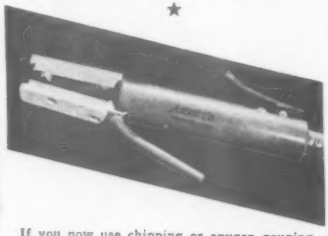
Trade name CADDY

ERICO PRODUCTS, INC.
2070 East 61st Place • Cleveland 3, Ohio

On Display at National Metal Exposition Booth M158

Big Advancement in Metal Removal

Arcair TORCH



If you now use chipping or oxygen gouging you can increase production and make more profits with the ARCAIR Torch.

the ARCAIR Torch . . . is a gouging and cutting torch which operates on an ordinary DC welding machine and a compressed air line—

the ARCAIR Torch . . . removes defects in castings or forgings, cleans roots of welds, removes welds—and gouges, cuts or bevels mild steel, stainless steel, hard alloys, brass, bronze, monel, cast iron, or any other metal—the ARCAIR Torch . . . works on ALL metals—no oxygen or fuel gas required—

• Write today for folder which gives all details

Arcair **Company**
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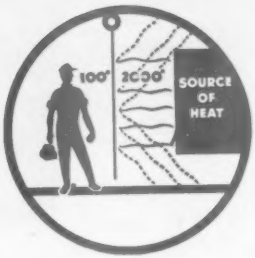
BREMERTON • WASHINGTON



Welding Curtain Reflects Away Heat up to 2,000 F

WELDORS who have to work close to blast furnaces, heat-treating furnaces, etc., can be protected by the "Ray-Foil" curtain, a flexible cloth that reflects radiant heat. Tests under working conditions have shown that when the temperature is 2,000 F on one side of the curtain, it is only 100 F on the other side.

Other uses for the curtain are in coke ovens, cement plants, boiler rooms, fire departments, airports and in research laboratories. It can also be used as a carrying shield, a baffle, a standing shield or be fabricated into aprons, insoles, gloves and other clothing.

SAFETY FIRST SUPPLY CO., 425 Magee St., Pittsburgh 19.

* * *

Metal Guards for Grinding Wheels

MORRISON Products, which is said to make 90% of the wheel guards used on portable grinders, was recently asked by the Safety Committee of the Grinding Wheel Institute to complete its line of drawn-steel wheel guards for portable, flexible shaft and bench grinders. Reason for the request: stress of armament activity is forcing many plants to employ less experienced help so that guard protection, always important for safety, has now become a must. Older men, women recruits and part-time helpers need extra safeguards as they begin to fill in our labor force.

Wheel guards are now available for 4, 5, 6 and 8 in. straight grinding wheels; for small grinders having 2, 2½, 3 or 4 in. wheels; and for wheels used with flexible shaft grinding equipment. For angle grinders, sanders and polishers, three types of guards are offered: a revolving cup guard for flaring cup wheels, a guard for disc-type cut-off wheels, and an adjustable guard for flaring-cup and straight-cup snagging wheels.

MORRISON PRODUCTS, INC., 16816 Waterloo Road, Cleveland 10.

SPATTER-EX COMPOUND

EFFECTIVE IN EITHER ARC, FLASH OR BUTT WELDING.

Prevents Bonding of Welded Spatter

to parts which are to be welded.

Easy to use—simply coat the surfaces which will be struck by spatter. A film is formed which prevents bonding. Spatter-Ex can be quickly washed off with water or metal cleaner solution. It reduces labor time and costs by eliminating chipping, grinding, steel brushing and other cleaning operations required ordinarily to remove spatter.

Another time and cost saver

FLASH-EX COMPOUND

Widely used in preventing flash adhesion and in preventing bonding in resistance welding.

Write for samples or send trial order

WAYNE CHEMICAL PRODUCTS CO.
Metal-Working Oils & Compounds
9800 Copeland, Detroit 17, Mich.

KEROTEST

Announces

NEW AND IMPROVED CYLINDER VALVES

Say **306** **for OXYGEN**

New! Kerosprene ‡2 Seating —Genuine Teflon Packing

Say **C-92** **for ACETYLENE**

One internal for POL and commercial outlets. For wrench or handwheel operation.

KEROTEST
MANUFACTURING COMPANY
PITTSBURGH 22, PA.

PIERCE

"First Name" in

GOVERNORS

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PIERCE SERVO GOVERNORS

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BELT-DRIVEN UNIVERSAL TYPES FOR ALL ENGINES

Special Governors for Chevrolet, Ford, Chrysler, Willys and most other standard engines.

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See Your Welding Supplies Dealer or write to

THE PIERCE GOVERNOR CO., INC.
1607 Ohio Ave. Box 1000 Anderson, Indiana

Going to the

METAL SHOW?

VISIT US IN BOOTH 256 Building G

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THE WELDING ENGINEER

Big Lucite Eye Shield Covers Prescription Lenses

A "JUMBO" size Sellstrom eye shield will cover the largest rims made for prescription glasses. The following widths are now available: 4¾, 5, 5½ and 6 in. Demand for the original No. 39 shield, designed as a lightweight wide-vision protection in grinding and shop work, showed the need for covering plastic-rim glasses also. The 6-in size was added to make sure of covering even the largest present-day rims.

SELLSTROM MFG. CO., 626 North Aberdeen St., Chicago 22.

* * *

Non-Acid Soldering Flux Comes in Paste Form

"LA-CO" non-acid soldering flux is said to dissolve oxides of metals rapidly to prepare a clean surface for soldering. Put up in paste form, it is claimed to be applicable to copper, brass, lead, galvanized iron, tin, steel, cast iron, terne plate, zinc, etc. It is said to be resistant to extreme cold and decomposing factors and to be easily cleaned off after soldering is finished.

LAKE CHEMICAL CO., 3052 West Carroll Ave., Chicago 12.

NEW PRODUCT BRIEFS

Economical, transparent plastic badge holders come in a variety of sizes fitted with attached high-spring pin clasps. Identifying photos or passes are slipped in between plastic sheets. American Kleer-Vu Plastics, Inc., 59 Thames St., Brooklyn 6, N. Y.

* * *

All-steel work bench with sturdy laminated wood "Nat-Flex" top is recommended for electrical, soldering, assembly, miscellaneous jobs. Natkin & Co., 1601 So. Hanley Road, St. Louis 17.

* * *

Asbestos base, silicone-treated high temperature electrical insulation can be used for wire wrapping or on air-cooled, inert gas or silicone filled transformers. Called "Quinterra Type 3" it is a Class H insulation. Johns-Manville, 22 East 40th St., New York City 16.

AT THE METAL SHOW

Detroit — Oct. 15th through 19th

Booth C-127 in Building "C"

(Woodward Ave. Parking Lot)

ARONSON MACHINE COMPANY PRESENTS

MODEL 21 — *The Ultimate in Welding Positioners*

1 A machine tool. Push button control ideally suited to fully automatic welding and sequence tooling.
2 Instant start-stop electric clutch-brake table rotation.
3 Infinite precision speed control table rotation — zero to 2.7 RPM.
4 Instant "rapid positioning" at 4 RPM regardless of variable speed setting.
5 Powered push button elevating, precision limit switches, 1½ inches per second.
6 Powered table tilt, precision limit switches, 6° per second.
7 Sealed mercury grounding complete, even at tilt trunnion bearings.
8 Timken bearings and ball bearings throughout. Vee-grooved casters in base.

(Stop at our exhibit and operate this machine yourself. Ask for Dave Wood or Barney Aronson.)

Aronson MACHINE COMPANY

ARCADE, NEW YORK

BUY

SELL

USE

SHAWINIGAN CARBIDE

SHAWINIGAN PRODUCTS CORPORATION

EMPIRE STATE BUILDING

NEW YORK 1, N. Y.

METAL BOND

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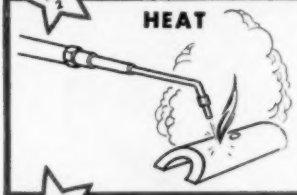

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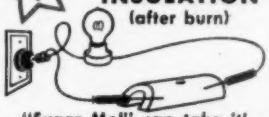

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